ENVIRONMENTAL REGULATION OF COMMERCIAL FLOWER PRODUCTION IN ETHIOPIA

By

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Dedication

Dedicated to my children,
Nobel, Noah and Manna
whom I gave birth while writing this PhD thesis.
Having you made me stronger, better and more fulfilled. Words are not enough to express my love for each of you.

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Declaration

This thesis is entirely my own work. I confirm that it has not been submitted either in part or in full for any Degree or Diploma to this or any other university.

I declare that part of Chapter Three of the thesis was published in *Bahir Dar University Journal of Law (2013, Vol. 4, No. 1)*. However, it was written as part of the thesis and improved after publication.

Mekdes Tadele Woldeyohannes

Acronyms

ADLI	Agricultural Development Led Industrialization
CBD	Convention on Biological Diversity
DDT	Dichloro-diphenyl-trichloroethane
EIA	Environmental Impact Assessment
EHDA	Ethiopian Horticulture Development Agency
EHPEA	Ethiopian Horticulture Producers Exporters Association
EPA	Environmental Protection Authority
FAO	Food and Agriculture Organization of the United
FDI	Foreign Direct Investment
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Production
GTP	Growth and Transformation Plan
HF	House of the Federation
HPR	House of People‘s Representatives
MNCs	Multinational Corporations
MOA	Ministry of Agriculture
MOARD	Ministry of Agriculture and Rural Development
MoEFaC	Ministry of Environment, Forest and Climate Change
MoWIaE	Ministry of Water, Irrigation and Energy
PASDEP	A Plan for Accelerated and Sustained Development to
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural
WHO	World Health Organization

Abstract

Floriculture, a flourishing industry since the end of 1990s, is a source of livelihood for thousands of people in Ethiopia. Investment into the sector has been promoted with the objective of creating employment opportunities, foreign exchange earnings and links to the international market. Flowers are now among major export commodities along-side other agricultural products such as coffee and oil seeds. The sector's contribution as a source of employment is considerable in terms of poverty reduction as poverty is a deep rooted problem in Ethiopia. However, there are challenges related to employment conditions and environmental externalities. This thesis examines into the problems of environmental protection and regulatory frameworks regarding the floriculture industry. It provides analysis on factors that affect the effective implementation of regulatory frameworks.

The thesis addresses the main environmental challenges associated with flower production. The main analysis is that in Ethiopia the problem basically lies with excessive application of pesticides and fertilisers; the impact eventually extends to affecting water and soil quality. Concerns about excessive utilization of surface and ground water are also addressed. With case studies of two freshwater lakes, the thesis demonstrates how establishment of floriculture companies adjacent to lakes compromise water quality and quantity, and affects aquatic life. Focusing on each environmental problem, the thesis provides analysis on existing regulatory frameworks and identifies lack of effective implementation as the root of the problem leading to environmental degradation. The country's level of development has been a restricting factor to channel resources necessary to employ expertise and infrastructure. At the same time, there are tendencies of prioritizing economic development, through attracting investment, than environmental protection driven by the belief that strict regulation obstructs investment.

The thesis also highlights that absence of effective and adequate regulatory framework has been a challenge to the objectives of investment promotion in Ethiopia and the right to improved living standard and to sustainable development guaranteed in the Constitution. The thesis suggests that strict monitoring and inspection of flower production process is needed, and the primary response to regulate environmental impacts must rest on the government. It identifies a number of intervention areas, including strengthening pesticide registration and control system, putting in place water use and discharge permit systems, requiring Environmental Impact Assessment reports and supporting companies to implement sustainable flower production methods. Promoting good agricultural production methods, private environmental standards and certification schemes can play role in improving environmental standards. However, compliance expenses can restrict industry wide implementation of the standards. The analysis offered in the thesis provides an evaluation of the main challenges facing the Ethiopian flower industry at a time of increasing volatility in the market. This is the first legal analysis of the environmental impact of flower industry in Ethiopia.

Introduction

Background

Floriculture involves the cultivation and marketing of flowers and ornamental plants usually under greenhouse conditions. Different from other agricultural activities, it has unique and complex interaction with the environment. Every stage in flower production- plant growth management, post-harvest handling and transportation- can have environmental repercussions.[1] Varieties of inputs, such as fertilizers, pesticides, growth regulators, water, growing structures, packaging materials and energy, are intensively used to grow flowers that meet market requirements. [2] The greenhouse creates conducive environment for pest outbreak that leads to excessive application of chemical pesticides. As a consequence, soil degradation, environmental pollution, and contamination of freshwater resources can result in.

Even though floriculture is relatively a recent phenomenon (its beginning marked end of 1990s) in Ethiopia, it has been flourishing as an industry having enormous significance for the country as a source of employment. Favourable investment conditions in the form of incentives have been put in place as part of the country's investment policy, which has contributed to attract investment to the sector. The country's geographic proximity to major flower markets, particularly the Netherlands and other European countries, coupled with suitable climate condition for flower growth becomes a major factor for the growth of the industry. In less than two decades since the first private investment is established, flowers became one of the major export commodities alongside other agricultural and industrial products, such as coffee, oil seeds, leather, textile and meat.

Though it is commendable to uphold the economic contributions of the sector, adverse environmental impacts of flower production have become a major concern

[1] Abiy Sahle and José Potting, 'Environmental life cycle assessment of Ethiopian rose cultivation', *Science of the Total Environment* (2013), Vol. 443. Chapter two provides detail explanation about how every stage in flower production can lead to environmental degradation.

[2] *Ibid*., p. 164; Tanya J. Hall *et al*, 'Factors affecting growers' willingness to adopt sustainable floriculture practices', *Hortscience* (2009), Vol. 44, No. 5, p. 4346

in Ethiopia. These concerns are ongoing and longstanding. A few researchers that have focused on specific topics establish the negative impacts on soil quality resulting from pesticides and fertilizer application and on freshwater lakes due to intensive water extraction and release of untreated agro-chemical residues. Sahle and Potting assessed environmental impacts of the overall production cycle of roses and the extent of inputs such as water, pesticide and fertilizers normally in use to produce a bunch of flowers in Ethiopia.[3] They identified nitrogen-based fertilizers as major contributors for environmental impacts, including abiotic depletion, global warming, human toxicity and marine aquatic ecotoxicity. The majority of flowers are soil grown and there has been leaching into the soil and ground water following application of chemicals. Attah and Regasa studied samples from effluent run-off, water from adjacent river and soils around floriculture greenhouses and found more heavy metal contents (Fe, Cu, Ni, Mn, Zn, Cr, Co and Cd) in the soils that can threaten the resource to degradation.[4] Similarly, Kebede, *et al*, conducted a study about impacts of greenhouse effluents on soil quality. They used floriculture effluent samples to grow wheat in greenhouse experiments and concluded that the effluents significantly influence soil chemical properties.[5]

A significant volume of pesticides is used in the floriculture industry to control various kinds of pests that affect the growth and productivity of cut-flowers. If plants suffer from pests or diseases, the yield and the quality of the plant will reduce substantially. The majority of flowers are exported to countries in the temperate zone that have established stringent phytosanitary standards in order to avoid entry and spread of pests into their territories. Customers also demand high quality flowers which are not affected by pests and diseases. However, pesticides which are in use for flower production can be hazardous for human health and the environment. Jansen and Harmsen analysed at accredited laboratory water samples

[3] Sahle and Potting, *supra* note 1, pp. 163–172

[4] L.E. Attah and Melkamu B. Regasa, Assessment of Heavy Metals, ph and EC in Effluent Run-off, River and Adjacent soil Around a Floriculture Industry in Holleta, Welmera District, Ethiopia, *Ethiopian Journal of Environmental Studies and Management* (2013), Vol. 6 No.6, pp. 620-629

[5] M. Kebede, S. Beyene and Y. Abera, Modelling the influence of floricultural effluent on soil quality and dry matter yield of wheat vertisols at Debre Zeit, Ethiopia, *Journal of Environment and Earth Science* (2012), Vol. 2, No. 2, pp. 40-50

collected from wastewater discharge from floriculture companies to Lake Ziway.[6] They established that effluent water draining to the lake contained 20 pesticides with concentration of 0.1 µg/l or higher. Among these pesticides, five are classified as high risk pesticides while four are moderate toxic compounds having ecotoxicological effects on water organism. Additional findings by Hanssen, *et al* suggest that organophosphate and carbamate pesticides are used by farms in the Ethiopian floriculture industry.[7]

Waste management is a major issue of concern in the industry. A study examined waste disposal practices of floricultural farms and indicated that solid wastes (chemical pesticide packaging, polythene greenhouse films and other plastic materials) are simply stored, buried or burnt in a pit on a desolate part of farms.[8] In most cases, wastewater is disposed in ditches or designated area while in other cases directly discharged to water bodies. Tilahun conducted a study to investigate environmental impacts of flower production.[9] He found that 30% of the farms established in the area of study discharge wastewater directly to water bodies while 40% drain to the land. Other studies focusing on the practices of wastewater disposal from floricultural companies establish the threat on freshwater lakes.[10]

Furthermore, floricultural establishments affect water resources in terms of quantity. Huge amount of water is normally used for flower production that occurs year-round in plastic greenhouses, competing with water uses for other agricultural

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[6] H.C. Jansen and J. Harmsen (2011), *Pesticide monitoring in the Central Rift Valley 2009-2010, Ecosystems for Water in Ethiopia, Land Use Planning Program for the Central Rift Valley of Ethiopia*, Alterra-report 2083, Wageningen UR, Wageningen

[7] Vegard M. Hanssen, et al, 'High Prevalence of Respiratory and Dermal Symptoms Among Ethiopian Flower Farm Workers', *Archives of Environmental & Occupational Health* (2015), Vol. 70, No. 4, pp. 204-213

[8] DLV Plant (2011), *Handbook for Greenhouse Rose Production in Ethiopia*, p. 97, http://www.dlvplant.nl/nl/core/media/file/Handbook_Rose_Ethiopia(1).pdf , accessed on 6 August 2015.

[9] Abayneh Tilahun (2013), *Environmental Impacts of Floriculture Industry in Debrezeit Town: A Need for Strategic Environmental Assessment*, MSC Thesis, Environmental Planning and Landscape Design, Graduate Study in Environmental planning and Landscape Design, Faculty of Technology, Addis Ababa University, Ethiopia

[10] T. Ayenew and D. Legesse, The Changing Face of the Ethiopian Rift Lakes and Their Environs: Call of the Time, *Lakes & Reservoirs: Research and Management* (2007),Vol. 12; Malefia Tadele (2009) *Environmental Impacts of Floriculture Industries on Lake Ziway: With Particular Reference to Water Quality,* MSC Thesis, School of Graduate Studies, Addis Ababa University, Ethiopia

activities, domestic water supply and ecosystem requirements. The use of scarce water resources is a major challenge for development of the floriculture industry in Ethiopia where there is recurrent droughts followed by famines. In his comparative study of rose production in Ethiopia and Dutch, de Varies found that the amount of water used in Ethiopia for rose production (i.e. six to seven litres of water per square meters per day) is two times more than what is required to produce roses in the Netherlands.[11] The calculation is based on the presumption that there is similar evotranspiration in greenhouses found in these two countries. As indicated in Vilalta's study, the Central Rift valley, where the largest greenhouse complex is located, there is overexploitation of water.[12] Non-availability of incentive (economic or non-economic) to use water efficiently and lack of effective and full-fledged regulatory mechanism are leading problems in the management of water. The thesis indicates that rate of water abstraction is 'unsustainable' and the situation will be aggravated if the amount of extraction is increased.

Recent research on the Ethiopian floriculture industry has focused on economic development and environmental protection balance.[13] It indicated the negative impacts of commercial flower production on the environment. The research pays special attention to waste disposal problems in floriculture establishments around Lake Ziway. The findings of the research raise concerns about regulatory and institutional capabilities (skills, commitment, integrity and budget) of pertinent entities in charge of monitoring and implementation of the code of practice for floriculture. With case studies of some floriculture farms, it explains efforts made so far to introduce biological pest control method which is involves the control of pests using bio-control agents (i.e. viruses, bacteria, fungi, and insects) and hydroponics- a method of production on soilless media. The research, having acknowledged the helpful contribution of the methods in minimizing environmental deterioration, underlines on the need for regulatory schemes, for example, to

[11] Willem de Varies (2010), Qualitative comparison of Dutch and Ethiopian rose production systems: *Why Dutch rose growers move to African nations and what consequences does this migration have?,* MSC Thesis, University of Groningen

[12] E. R. Vilalta (2010), *Water Resources Management in the Central Rift Valley of Ethiopia,* MSc Thesis in Civil Engineering, Universitat Politecnica De Catalunya, Barcelona

[13] Elias Nour (2012), *The Investment Promotion and Environment Protection Balance in Ethiopia's Floriculture: The Legal Regime and Global Value Chain,* PhD Thesis, University of Warwick, Uk,

render hydroponics mandatory in future projects and extensions. However, costs involved with these technologies and limitations in technoscientific capabilities are impediments for Ethiopia's flower farms to introduce improved and environment friendly practices. This research, however, does not provide detail analysis on how commercial flower production is regulated in the Ethiopian legal system.

The above research findings are important in terms of providing basic information and empirical data about the sector and its impacts on the environment. However, there are gaps in examining the strengths and weaknesses of the regulatory system on flower production in Ethiopia and the factors affecting strict implementation of regulation. There is only a book chapter by Hatch and Wells that provides brief summary of environmental governance in relation to the industry.[14] Yet this study is shallow in terms of extending detailed analysis of the law and the problem beneath the regulatory system. Being the first detailed legal study of the subject, the main focus of this thesis is on the regulatory system and forms of regulation to be found in the Ethiopian legal system. It aims at assessing how the environmental adverse impacts of commercial flower cultivation are regulated in Ethiopia. In doing so the thesis critically examines the role of national, international and non-binding instruments in regulating pesticides, water use, aquatic life, and the industry's adverse impacts on the soil.

The main instigating factor for this study to focus on regulatory issues is a deep-rooted concern about environmental degradation and resource over-exploitation associated with flower production.[15] As a labour intensive sector, floriculture is enhanced in Ethiopia to reap, among others, the benefit of employment opportunity and reduce extreme poverty. However, the environment is prone to degradation due to different factors. The nature of commercial flower production

[14] Nina Hatch & Lindley Wells (2012), "Multilevel Environmental Governance -The Case of Ethiopian Floriculture' in Colby Environmental Policy Group, *Environmental Policy Update 2012: Development Strategies and Environmental Policy in East Africa,* Waterville, Maine: Colby College Environmental Studies Program, http://web.colby.edu/eastafricaupdate2012/key-issues-in-ethiopia-2012/chapter-2/ , accessed on 10 March 2015

[15] I myself, born and grown in Ethiopia, share the concerns raised in relation to commercial flower production. As I am very close to the problem and these are the concerns of the society within which I belong, I am motivated to investigate into the problems of flower production and existing regulatory systems.

normally involves the application inputs such as pesticides and water in excessive amount and generation of wastes which can be detrimental to the environment. Yet, it is believed that a well-regulated investment can have immense contribution for development. How far can countries like Ethiopia, which have poverty reduction as their primary agenda and financially challenged to build strong institutional capacity, can protect their environment against investment related degradation is an issue that prompts interest to study on effective regulation. The floriculture sector in Ethiopia flourished shortly after the country introduced a free market economy and following measures to encourage private sector investment. It is thus important to investigate that existing regulatory frameworks are effectively adequate to regulate environmental impacts associated with the investment.

It is clear that the environment and ecological resources of countries hosting investment are vulnerable to degradation.[16] Impacts will be worse where there is loose environmental regulation of investment activities. Though countries need to put in place regulatory frameworks that can minimize environmental degradation, competition to attract investment often leads them to compromise their environment.[17] There is a deep rooted attitude that investment will be more attracted to countries with lax environmental regulation that are less burdensome for companies' production costs. In this research the main issues are assessed in the contexts of these arguments. Countries like Ethiopia compete to attract more and more investment while adverse impacts on the environment are not well considered and managed.[18] Laws are insufficient to regulate investment or existing

[16] K. R. Gray, Foreign Direct Investment and Environmental Impacts- Is the Debate Over?, *RECIEL* (2002), Vol. 11, No. 3; B. Gentry, "Foreign Direct Investment and the Environment: Boon or Bane?", in OECD (1999), *Foreign Direct Investment and the Environment , OECD Proceedings,* OECD, Paris; L. Zarsky, Havens, Halos and Spaghetti: Untangling the Evidence about Foreign Direct Investment and the Environment, in OECD (1999), *Foreign Direct Investment and the Environment,* OECD, Paris

[17] These issues are further addressed in Chapter Three. See L. Zarsky (2005), *International Investment for Sustainable Development: Balancing Rights and Rewards.* Earthscan, London; See also T. H. Moran (2006), *Harnessing Foreign Direct Investment for Development: Policies for Developed and Developing Countries*, Center for Global Development, Washington, D.C.

[18] Mulugeta Getu, Ethiopian Floriculture and Its Impact on the Environment: Regulation, Supervision and Compliance, *Mizan Law Review* (2009), Vol.3, No.2

laws can be ineffectively implemented leading some sectors dubbed deregulated".[19]

Academic writers that argue for strict environmental regulation are optimistic that investment, if well regulated, can contribute for sustainable development of host countries.[20] Accordingly, countries can balance the need to enhance economic development, through attracting investment, with environmental protection interests. Others stress on the need to prioritise economic development over environmental protection goals with the belief that it is only if a country attains a certain level of development that it can protect its environment.[21]

Traditionally, environment regulatory tasks were reserved for state governments. However, the complexity of environmental regulation, competition for investment, financial constraints and the sheer size of many multinational enterprises can make environmental regulation challenging for governments. [22] This calls for participatory form of environmental governance where stakeholders take part in environmental regulation. In this form of governance, business entities show motivation towards implementing voluntary environmental standards and programmes. The standards promote good agricultural practices on efficient use of resources, pollution control measures, and alternatives to chemical pesticides as well as fertilizers. Adhering to the standards is also requirement to access international markets as there are

[19] Ibid., p. 258; N. D. Woods, Interstate Competition and Environmental Regulation: A Test of the Race-to-the-Bottom Thesis, *Social Science Quarterly* (2006), Vol. 87, No. 1

[20] Zarsky, supra note 15; L. Zarsky, Havens, Halos and Spaghetti: Untangling the Evidence about Foreign Direct Investment and the Environment, in OECD (1999), *Foreign Direct Investment and the Environment,* OECD, Paris

[21] T. Panayotou (1993), *Empirical Tests and Policy Analysis of Environmental Degradation at Different Stages of Economic Development*, Working Paper WP238 Technology and Employment Program, International Labour Office, Geneva; T. Panayotou (2003), *Economic Growth and the Environment*, Harvard University and Cyprus International Institute of Management, Paper prepared for and presented at the Spring Seminar of the United Nations Economic Commission for Europe, Geneva, March 3, 2003, http://www.unece.org/fileadmin/DAM/ead/sem/sem2003/papers/panayotou.pdf, last accessed 13 September 2013. There is also a belief that environmental regulation impedes economic growth. See R. C. Feiock and C. Stream, Environmental Protection Versus Economic Development: A False Trade-Off? *Public Administration Review* (2001), Vol. 61, No. 3, pp.313-314

[22] See Chapter Three for further discussion. G. Goldenman, "The Environmental Implications of Foreign Direct Investment: Policy and Institutional Issues", in OECD (1999), *Foreign Direct Investment and the Environment,* OECD, Paris, p. 85 P. K. Wapner (1996), *Environmental Activism and World Civic Politics,* State University of New York Press, 1996, pp. 17-18; D. J. Fiorino (2006), *The New Environmental Regulation*, The MIT Press, Cambridge,

growing demands by end users. Yet the accessibility of these agricultural technologies and production methods for producers in developing countries can be challenging due to involved expenses and expertise.[23] Within this framework, the thesis takes account of research that investigates the operation of private environmental standards and self-regulatory schemes in the floriculture industry in Ethiopia.

The Research Questions

The major research question posed in the thesis is: "how effectively is the environmental impact of flower production regulated in Ethiopia?"

Other specific but related questions are:

- What are the main environmental challenges associated with commercial flower cultivation?
- How are pesticides, wastes, water resources, aquatic life and the soil regulated in the Ethiopian legal system? What roles do national, international and non-binding instruments play in the regulation?
- What challenges do developing countries, including Ethiopia, face to strictly regulate their environment?
- What are the main problems in the regulation of environmental impacts of flower cultivation in Ethiopia?
- What scientific/ technical methods are available to mitigate environmental impacts of flower cultivation?
- What motivates growers to adopt sustainable flower production practices?
- What are the main challenges that restrict industry wide implementation of sustainable flower production practices?
- How do private environmental standards and certifications contribute in minimizing environmental impacts of flower cultivation in Ethiopia?

[23] See Chapter Two and Chapter Eight for detailed discussion.

Method and Methodology

The thesis draws on research on the existing environmental regulatory framework in Ethiopia relevant to flower production. It also involves theoretical issues on environmental protection of direct investment and related development approaches. Thus, the research is predominantly qualitative and relied on data from academic literature, government policy and strategic documents, legislation, multilateral environmental agreements, and electronic media sources.

In-depth interviews aimed at soliciting information about practical implementation of regulatory requirements were held with the main office-holders and expertise at:

- Ethiopian Horticulture Development Agency
- Ethiopian Horticulture Producers and Exporters Association
- Ministry of Agriculture and Natural Resources
- Ministry of Water, Irrigation and Energy
- Ethiopian Institute of Agricultural Research
- Ministry of Environment, Forestry and Climate Change

The interviewees were informed that the information they provide will be used for exclusive academic purposes. Their consent was obtained after they were communicated about their rights and consented for their names to appear on this research.

The research for the thesis also consists of case studies into two fresh water lakes. The rational for the studies was to provide detail analysis, in exemplary forms, of the environmental risk on water resources due excessive water extraction and pesticide application in flower production. It also helps to illustrate how common resources can be extensively exploited by different development activities in the absence of integrated water management and effective regulation. The findings of the studies are mainly based on literature and legal inquiries. Ethiopian civil society is undergoing a difficult period due to financial austerity and deep political divisions within society. The opportunities for field research with the main stakeholders and growers proved impossible in the circumstances of the time.

Organization of the Thesis

The thesis is organized into nine chapters. The first chapter provides background information about the Ethiopian floriculture industry; narrates how the industry evolved and contributes to the country's economy. The role of the industry in creating employment opportunity is highlighted while concerns about environmental impacts are touched upon. Chapter Two explores the nexus between floriculture and environment. It outlines the major environmental impacts associated with flower production and some sustainable flower production methods. It stresses that sustainable flower production methods are valuable in terms of protecting host states' environment. Good agricultural practices which are promoted by private standards are given special focus in Chapter Two.

Chapter Three addresses such issues as how the environment and ecological sources of host countries are vulnerable to degradation and why and how investment should be promoted in developing countries. It explains how the aspiration to achieve development, through attracting investment, can lead developing countries to compromise the protection they should accord to the environment. It sets out the challenges facing developing countries in regulating the adverse environmental impacts of direct investment. Multilevel environmental governance indicating the respective role of different stakeholders in environmental protection is proposed in the chapter. The environmental governance and regulatory framework in Ethiopia is introduced in Chapter Four. The constitutional guarantee for the right to sustainable development and the objective of investment promotion in Ethiopia which is to improve living standards and to accelerate economic development is highlighted in chapter Four. These principles and objectives need to be reinforced by effective environmental regulatory frameworks. However, there are limitations in environmental legislation to give wider room for stakeholder participation in environmental protection. However, the unique features of the code of practice for floriculture regulation in terms of encouraging companies to implement good agricultural practices by going beyond the minimum legal requirement is underscored. The primary responsibility to regulate the environment is thus rests on the government.

Chapters Five to Seven focus on analysing existing regulatory frameworks on pesticides registration and control; water resources, aquatic life and wetlands, and the soil, respectively. Problems in implementation and legal lacunas are identified. Chapter Six incorporates case studies on Ethiopian freshwater lakes that explain the impact of flower production on water quality and quaintly. The chapters indicate that weak environmental regulations in Ethiopia are strongly associates with "race to bottom", i.e. deregulation of the environment in order to attract or retain investment in the country. The second factor is problem in institutional capacity due to financial and infrastructure constraints as well as lack of expertise. The chapters also discuss the applications of international environmental agreements and their limitations to regulate some environmental problems associated with floriculture.

Chapter Eight is devoted for the discussion of private environmental standards and self-regulatory initiatives relevant for the floriculture industry. The discussion is important as adherence to the standards is basic requirement to access market opportunities. The flower sector is export-oriented and the flower-value chain is characterized as buyer-driven. The chapter demonstrates how private environmental standards and certification schemes can influence flower production processes in developing countries. However, implementation costs and lack of expertise can be major constraining factors for industry wide implementation of private environmental standards and good agricultural practices.

Briefly outlining the issues discussed in each chapter, Chapter Nine brings together the main conclusions. The main conclusions set out in the thesis underline on the need to put in place effective environmental regulatory system in Ethiopia without which it is difficult to achieve sustainable development through promoting investment in the floriculture sector. It concludes that regulations are not effectively implemented due to absence of political commitment to enforce legislation due to the conventional wisdom which instils the belief that strict regulation affects the "investment friendly environment". There are important lessons to be gained from the Ethiopian experience in environmental regulation of investment into the floriculture industry. Lack of institutional capacity to formulate

and implement environmental regulation is a constraining factor in the struggle for effective regulation. Finally, the chapter indicates that environmental protection is complex within the social, economic and political contexts of Ethiopia and environmental degradation will remain a concern as investment into labour intensive sectors, like the floriculture, continue to be encouraged as a means to reduce poverty.

Chapter One: The Ethiopian Floriculture Industry

Introduction

Floriculture is defined in terms of an industry that involves the "cultivation, production and marketing of flowering and ornamental plants under controlled conditions".[1] It includes the production of seeds, bulbs, cut-flowers, foliage and live plants either on open field or in greenhouses. More than 125 varieties of cut-flowers are grown worldwide; the most important of which are roses, carnations and chrysanthemums.[2] Cut-flowers have been the major product that the Ethiopian floricultural industry is engaged in. About 84 companies cultivate roses (mostly) and other types of flowers on 1500 ha of land.

The Floriculture industry has been growing since the first private investment in the sector started operation in Ethiopia in 1990's. The industry has become one of the major sectors having immense significance for the country as a source of employment. It has succeeded in becoming a major export commodity next to coffee, oil seeds, leather, textile, meat, fruit and vegetables, live animals, chat and gold.[3] The government in its effort to tackle the country's poverty has afforded much attention to this industry. A series of five-year economic plans, which have contributed towards the sector's growth, have been adopted since 1991. Numerous government incentives have been provided to investors who engage in floriculture. The favourable investment platform created to private investment in general, and the special attention afforded to floriculture in particular has prompted foreign and domestic investors to invest in the sector in Ethiopia. The fact that the country possesses climate conditions which are suitable for flower production coupled with

[1] Nico De Groot (2012), *A World Wide Business and International Challenges ??-??-2012*, Wagningen UR, The Netherland, p.3, http://www3.u-toyama.ac.jp/tulip/te/nico2012A.pdf , accessed on 21 October 2013

[2] Barbara Dinham (2008), Flowers – a tale of beauty and the beast, *Pestcide News 82*, December 2008, p. 19; Ruud.L.M. van Uffelen and Nico.S.P. de Groot (not dated), *Floriculture World Wide; production, trade and consumption patterns show market opportunities and challenges*, Wagenigen UR, The Netherland, http://ageconsearch.umn.edu/bitstream/29148/1/pa05va01.pdf , accessed on 3 November 2013

[3] Information acquired from Ethiopian Investment Agency, http://www.investethiopia.gov.et/why-ethiopia/economic-indicators , accessed on 22 October 2015.

its strategic location close to the major markets in Europe constitute among the major factors in attracting investors to the floriculture industry in Ethiopia.

This chapter provides an introduction to the Ethiopian flower Industry. The thesis is focused on the main challenges facing the flower industry; the successes achieved, including the major flower trading destinations and current trade patterns. The chapter deals with the major economic policies adopted in the country especially since the last two and half decades and their implications to private investment in Ethiopia in general and the floriculture sector in particular. It presents that the sector is favoured by Ethiopian government due to such economic grounds as employment opportunity and foreign exchange earnings.

1.1. The Development of the Ethiopian Floriculture Sector

1.1.1. The Industry at its Infancy

Commercial cut-flower production started in Ethiopia in 1980/81 by Horticulture Development Corporation, a state owned enterprise.[4] The Corporation took the initiative to produce and export summer flowers on state owned farms (first in Zeway state farm followed by Debre Zeit and Tibila) in collaboration with the German Society for Technical Co-operation.[5] Although it could have been possible to acquire some expertise in flower production with this experience, very little had been achieved until recently.[6] The command economy that the country had been pursuing during that period failed to boost the industry.

Following the downfall of the socialist regime and the adoption of structural adjustment program in 1991, measures were taken to bring about a free-market economic policy.[7] Agriculture Development Led Industrialization (ADLI) was the

[4] Ethiopian Investment Agency (2008), *Investment Opportunity Profile for Cut-flower Production In Ethiopia*, (Updated 2008), p. 1

[5] According to the Ethiopian Investment Agency report during the trial periods about 20 species of different cut-flowers were introduced into the country from abroad [Canary Island and Holland] for production by the state farms. Among these were Statice, Dill, Ammi, Euphorbia, Carthamus and Allium. *Ibid*.

[6] Mulu Gebreeyesus and Michiko Iizuka (2012), Discovery of Flower Industry in Ethiopia: Experimentation and Coordination, *Journal of Globalization and Development,* vol. 2, No. 2, p. 8

[7] Policy reforms include: deregulated markets and prices, privatized state owned businesses, adjusted fiscal and monitory policies and lifted trade barriers and subsidies. Jeffrey Herbst, The

major economic policy which had been introduced. The underpinning assumption about ADLI was that the development of the agricultural sector could lay the major foundation for industrialization through providing supply of inputs, generating foreign exchange for importing industrial inputs and creating markets for industry outputs. Trade policy reforms that aimed at promoting diversified commodity exports were part of the Structural Adjustment Programme. Subsequently, though floriculture was not included, the country identified lists priority sectors. The need to enhance competitiveness at international market and the role of the private sector as a driver of industrialization process were recognized with the formulation of Industrial Development Strategy in 2002.[8] The strategy provided leverage for the government to engage with the private sector by providing direct support and creating conducive environment.

The shift in the economic policy from command to market economy has prompted private investors to invest in the country in various sectors including in floriculture. The first private farm, Meskel flower PLC, managed to start operation in 1992 with summer-flower production and shifted its production to roses, exporting to the European market for the first time in 1997.[9] Despite the availability of steel greenhouse technology on the market, it used wooden greenhouses.[10] After few years, a second private farm, Ethio-flora, was established in Zeway following the

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Structural Adjustment of Politics in Africa, *World Development* (1990), Vol. 18, No. 7, pp. 949-958. The inception of structural adjustment programme can be traced back to early 1980 where countries had to adopt a series of policy measures aimed at coping with severe international economic crises associated with oil price shock and debt crises. The programme was made precondition by the private banks and the multilateral agencies before grant of loan. Thus, loans would be provided over a period of several years conditioned on reforms in trade protection and price incentives for efficient resource use. See S. Edwards and S. V. Wijnbergen, Disequilibrium and Structural Adjustment, in *Handbook of Development Economics* (1998), Vol.2, pp. 1481-1533

[8]EDRE, Industrial Development Strategy of Ethiopia, August 2002. The Strategy, in page 4, states that the "industrial competitive capacity would be achieved only when it is possible to promote strong export oriented industry and be able to transform to and implement this industrial competitiveness in other industrial sectors too". Labour-intensive industries and export-led development are particularly promoted by the strategy document. See Section 1.2 below for the Economic Policies of the country from historical and contemporary context.

[9] Ayelech T. Melese and A.H.J. (BERT) Helmsing, 'Endogenisation or enclave formation? The development of the Ethiopian cut-flower industry', *Journal of Modern African Studies* (2010), Vol. 48, No. 1, p. 44; Belwal and Chala wrote that the company is the first to specialize in rose production in Ethiopia and exported its first batch to Europe in 1998. Rakesh Belwal and Meseret Chala, Catalysts and Barriers to Cut-flower Export: A Case Study of Ethiopian Floriculture Industry, *International Journal of Emerging Markets* (2008), Vol. 3, No.2, P. 220

[10] Gebreeyesus and Iizuka, *supra* note 6; Belwal and Chala, *supra* note 9

footsteps of its predecessor. Both were owned by private domestic investors who produced mainly summer-flowers such as alliums, statice, and carnations for export to the EU markets. They were successful in getting support from the EU to employ consultants. However, as new entrants, they faced challenges forcing them to cease production soon; at this initial stage, the sector was not getting the required support from the government.[11] Gebreeyesus and Iizuka noted that the two companies contributed a lot to subsequent investors through their initial accumulation of flower-industry knowledge in Ethiopia.[12]

A modern and large-scale flower industry emerged with the establishment of Golden Roses, a foreign-owned firm, which launched rose production in steel structure greenhouses.[13] The company was established in June 1999 and has started exporting at the end of February 2000.[14] As the industry was still in its infancy, there were a number of problems that it had to tackle. Lack of trained work force was one of the main obstacles that Golden Roses had to overcome to sustain. Due to lack of domestic human resources, it was forced to employ foreign expertise side-by-side with training Ethiopian workers. As new firms enter the industry, particularly after 2003, the company suffered high turnover of skilled labour. It was on the face of these challenges that the company began to flourish and started exporting roses in 2000 via Dutch Action. Subsequently, it shifted its supply route to direct sale as the auction market offers low price which eventually challenged the firm with financial difficulties. Golden Roses was successful and advantageous in terms of the fact that its farm has been situated at high altitude unlike its predecessors.[15] The latter were located at lowlands putting them to geographically disadvantageous position which is suitable only for production of small to medium

[11] Gebreeyesus and Iizuka, *supra* note 6, p.11
[12] *Ibid*.
[13] *Ibid.*
[14] The company is foreign owned and was located in Tefki, Oromia Region, 38 km away from the capital city, Addis Ababa. It used to produce 10 varieties of flowers on 15 hectors of land and employed about 500 people. See Gizaw Molla (2004), *Ethiopia: Country Economy Memorandum*, Document of the World Bank, p. 19, www.worldbank.org , accessed on 31 July 2015.
[15] Golden Roses has been growing rapidly until 2007/08: Its work force rose from 115 to about 900; its production area increased from 7 hectares to 22.5 hectares; it started to import equipment, chemicals, and fertilizers (2003); and established a carton box factory (2004) and propagation facilities (2006). See Gebreeyesus and Iizuka, *supra* note 6, p. 6

sized rose varieties. [16] Besides, the predecessors of Golden Rose were not technologically well equipped. Benefiting from the geographical advantage, including using relatively modern technology, Golden Rose was engaged in production of medium to large sized highland varieties that command higher price in the world market.

Between 2001 and 2003, three domestically owned firms (Summit Agro Industry, Ethio Dreams, SIET Agro PLC,) and one foreign owned firm (Eniy Ethio Rose) joined the industry.[17] They collaborated with Golden Roses to learn from its experience and share equipment, storage facilities and skilled employees.[18] They imported construction materials (including greenhouses and irrigation systems) from Israel and the Netherlands, and employed experts from Kenya, India and Israel during the initial stages. Like Golden Roses, they mostly produced and exported highland roses. As a different market path to Golden Roses, the domestic firms mainly relied on the Dutch auction to sale their roses.

1.1.2. Encountered Challenges

Success in the production of flowers is based on a number of conditions, input and effort. These includes: good physical condition such as high light intensity, abundant water, clean soil and good climate; appropriate seeds and planting material; capital for investment; productive and skilled labour; expertise in growing and good management; pesticide and other chemicals; energy for heating and infrastructure; adequate logistic structure for exporting and supply chain infrastructure; knowledge of destination market; and meeting international trade and quality standards.[19] The major investments to start up include greenhouse construction, irrigation systems, postharvest facilities (cold store, packing hall, office, kitchen, lockers, changing rooms etc), water reservoir, electric power and/or generator, young plants, and fertilization and crop protection materials. By nature,

[16] Small-bud roses are seen as relatively cheap commodities for the mass markets, such as supermarkets. Big-bud roses are more expensive, with a higher value added. J. Wijinands, Sustainable International Networks in the Flower Industry Bridging Empirical Findings and Theoretical Approaches, *Scripta Horticulturae* (2005), Vol. 2, p.64

[17] Gebreeyesus and Iizuka, *supra* note 6

[18] *Ibid*., p. 13

[19] Wijinands, *Supra* note 16, pp. 26-27

flowers are highly perishable. They have short life lasting from few days to a couple of weeks. This demands an effective and uninterrupted chain of activities starting from the moment the flowers are harvested until they reach consumer. Lack of one of these conditions or failure to apply the necessary inputs and/or efforts can affect the success of a floriculture industry in any country.

There had been a number of challenges that companies had faced during early stages of the Ethiopian floriculture industry's development.[20] Lack of trained man power, poor infrastructure, shortage of construction materials, delays in crucial imports, and inability to meet quality standards and market access were some of the challenges the companies faced. Apart from this, early entrants were facing problems related to air transportation, finance and bureaucratic procedures to obtain land lease. This was partly due to lack of required support from the government. Even though there was a horticulture department under the Ministry of Agriculture and Rural Development, the attention paid to floriculture was weak.[21] The country's Agricultural Research Development Organization was focused on grain, citrus and banana products. For many years, policies were focused on increasing productivity of basic agricultural food items like cereals, milk, meat, fruits and vegetables.[22]

To overcome these challenges, firms endeavoured in different stages to raise awareness of the industry's profitability and the opportunity it could bring for the country and its citizens. In 2002, five companies organized themselves to form an association called the Ethiopian Horticulture Producers and Exporters Association

[20] Ruth Haug et al (2008), Trade, Environment and Development: Import of Flowers from Africa to Norway, Noragric Report No. 43, Norwegian University of Life Sciences, Noragric , pp. 22-23, http://www.umb.no/statisk/noragric/publications/reports/2008_nor_rep_43.pdf , accessed on 21 August 2015; Melese and Helmsing, *supra* note 9; Belwal and Chala, *supra* note 9; Mulu Gebreeyesus and Tetsushi Sonobe, Global Value Chains and Market Formation Process in Emerging Export Activity : Evidence from Ethiopian Flower Industry, *The Journal of Development Studies* (2012), Vol. 48, Issue 3, pp. 335-348

[21] Molla, *supra* note 14; Melese and Helmsing, *supra* note 9, p. 44; Gebreeyesus and Sonobe, after holding discussion with government officials and leaders if the industry officials, concluded that "the government was unaware of the major opportunity offered by the flower industry until the end of 2002". See Gebreeyesus and Sonobe, *supra* note 20, p. 336.

[22] Frank Joosten (2007), *Development Strategy for the Export-Oriented Horticulture in Ethiopia*, University of Wageningen, p.6

(EHPEA).[23] The association aimed to represent the sector with the task of facilitating market access, support implementation of responsible practices in relation to labour and environmental protection, and engage in capacity building of its member-firms. It played significant role in the development of the industry by lobbying support and attention from the government. The association achieved in coordinating inputs and partnerships between firms and the government to solve capability problems faced by the industry which was important to access the EU market.[24] This private-public relationship was further strengthened through the introduction of code of practice that promotes good agricultural practices in flower production. The association's engagements also extended to establishing export handling/forwarding, input supplier companies and diversifying market efforts as well as organizing training to address shortages of skilled labour.

Realizing the economic potential benefits of the sector, the government began to offer support since 2002 in the form of mobilization of resources and coordination.[25] Existing constraints that affected the sector's development and possible solutions were outlined. Government support areas were focused on access to land, access to long-term credit, infrastructure and air transport coordination. Land was made available near Addis Ababa, where the international airport is situated, at a price of under US$ 20 per annum per hectare.[26] The government also provided long-term credit facility through the Development Bank of Ethiopia. These made entry easier. Moreover, the Ethiopian Horticulture Development Agency was established in 2008 with the view to further strengthen the sector. Funded by the government, the agency provides support in three areas: investment, marketing and capacity building.[27] It has provided assistance to investors in acquisition of land and facilitation of access to basic infrastructure. In

[23] Initially the number of companies that formed the association was five. Now it reached 85 constituting 70% of producing and exporting horticulture enterprises operating in Ethiopia members of the association. The main mission of the association is "to promote and safeguard the sustainable competitive position of the Ethiopian horticulture sector within the global market", http://www.ehpea.org

[24] Gebreeyesus and Sonobe, *supra* note 20, pp. 336-337

[25] *Ibid*.

[26] Gebreeyesus and Iizuka, *supra* note 6, p. 17

[27] Information retrieved from the official website of Ethiopian Horticulture Development Agency, http://ehda.gov.et/services.html

order to enhance the competitiveness of the flower industry, the agency runs different capacity building programmes aimed to bring efficiency in management, production, harvest handling, marketing, productivity and quality. Furthermore, it has engaged in identifying market destinations; creating links between producers, potential importers and stakeholders; daily follow up export processes; and disseminating relevant market information to growers and exporters.

With the measures taken by the government and through the effort made by companies, individually or through their Association, the majority of the challenges that they were facing were gradually addressed. For example, different sites were identified and made available for floriculture and horticulture developments around major cities. Requirements to obtain land for investment were made simple with presentation of project profile, bank letter, investment certificate, Memorandum of Association and Article of Association.[28] In relation to air transportation, daily cargo flights were arranged through the nationally owned air carrier Ethiopian Airlines.[29] The Airlines constructed cold room for flowers and made functional since 2006. Initially, three logistic companies were chartering flights after dealing with flower growers. This arrangement was found disadvantageous especially for growers that export in small scale and eliminated with a new scheme that created direct service relationship with flower growers.[30] However, there are some problems that companies still encounter in flower production and require the attention of the government. For instance, there has been repeated outage of electricity at farm sites that forces companies to use diesel generators and leads to additional production cost.[31]

[28] Balwel and Chala, *supra* note 9, p. 221
[29] Elias Nour (2012), *The Investment Promotion and Environment Protection Balance in Ethiopia's Floriculture: The Legal Regime and Global Value Chain,* PhD Thesis, University of Warwick, Uk, pp. 187-190
[30] *Ibid*., p. 191
[31] *Ibid*., p. 230

1.2. Development Aspiration through Attracting Investment in the Floriculture Sector

With a population of 96.51 million, Ethiopia is categorised among low- income countries in the world.[32] In 2014, the country's Gross National Income (GNI) per capita was estimated to be $ 550 while life expectancy at birth in 2013 was 64.[33] Only 42% of the population has access to clean water. The majority of the people live in rural areas where poverty and deprivation are more severe and almost all rural households depend directly or indirectly on agriculture. Agriculture has made a large contribution to the country's economy; it accounted 45.9% share of the Growth Domestic Product (GDP) in 2014.[34] Agricultural products are primary-export commodities and constitute about 86% of the total exchange earnings.[35] In addition to this, the sector accounts for 85% of employment and supplies 70% of the raw material requirements of local industries. [36] Thus agriculture has significant contribution to the growth and development of Ethiopia. However, the sector has been highly affected by bad weather conditions (as it depends on rainfall) and poor cultivation practices leading to recurrent droughts and food insecurity.

Ethiopia has been adopting consecutive policies designed mainly to alleviate poverty and raise the level of economic development under different governments. During the regime of Emperor Haile Selassie (1931-1974)-the last Imperial ruler, the country pursued different modernization efforts.[37] It was planned to transform the economy from subsistence to agro-industrial. The country prepared successive development plans with the technical assistance of countries and institutions such as the United States, the former Yugoslavia and the Food and Agricultural Organization (FAO). Development of infrastructure, especially transportation and communication, and education were given special attention. The regime sought to

[32]Ethiopia, World Bank Data, http://data.worldbank.org/country/ethiopia, accessed on 31 July 2015
[33] *Ibid*. Life expectancy in Ethiopia was 45 and increased to 64 just recently. See http://www.who.int/mediacentre/news/releases/2014/world-health-statistics-2014/en/ , accessed on 22 October 2015
[34] Ethiopian Government Patrol, *Economy*, http://www.ethiopia.gov.et, accessed on 31 July 2015
[35] *Ibid*.
[36]Approximately 45% of Ethiopia's landmass is arable, but only about 10,556 thousands hectares are presently under cultivation. *Ibid*.
[37] Thomas P. Ofcansky and La Verle Berry (1991), Ethiopia, a Country Study, Federal Research Division Library of Congress, Kessinger Publishing

create conducive environment for the establishment of financial institutions, including private banks, and industries. However, due to lack of adequate statistical data and limited administrative capacity, the development plans failed to bring the desired result.[38]

In 1974, as the Imperial rule was overthrown by revolution and overtaken by the Derge, a military junta, the country adopted a socialist economic system. Land, financial institutions, manufacturing and agricultural firms and other private properties were nationalized. The economy was characterised by "falling productivity, soaring inflation, growing dependence on foreign aid and loans, high unemployment, and a deteriorating balance of payments".[39] The economy was mainly dependent on agriculture which was vulnerable to climatic conditions. The country also went through civil war and regional conflict. Because of these and other factors, economic growth was unstable. Between 1974/75 and 1989/90, growth, which was 4 percent on average between 1960 and 1974, declined to 2.3 percent.[40] In order to save the deteriorating economy, the government introduced reforms which allowed the private sector to invest in certain areas. In 1990, the government announced the replacement of the Marxist economic system with mixed economy.[41] However, before much progress was made, the Derge was removed from power by coalition of forces led by Ethiopian People's Revolutionary Democratic Front (EPRDF).

After the down fall of the Derge, market economy has been promoted in the country. The collapse of the Soviet Union and lack of foreign exchange reserve prompted FPRDF to pursue liberalization policy.[42] Legislation that restricted the market economy and private business were repealed. The government encouraged private investment in sectors other than those reserved for the state such as

[38] *Ibid*.
[39] *Ibid*., P. 145
[40] Alemayehu Geda (2007), "The Political Economy of Growth in Ethiopia", in B. J. al, *The Political Economy of Economic Growth in Africa, 1960-2000,* Cambridge: Cambridge University Press, pp. 116-139.
[41] Ofcansky and Berry, *supra* note 37.
[42] Geda, *supra* note 40; Alemayehu Geda and Befikadu Degefe (2005), *Explaining African Economic Growth: The Case of ethiopia,* AERC Working Paper.

investment in civil aviation, telecommunication, and railways. At the beginning of 1990s, the government introduced Structural Adjustment Programmes for the period 1993-96 with the support of the International Monetary Fund and the World Bank.[43] Following this, the government initiated privatisation programmes and transferred ownership of major industries and agricultural firms to both foreign and Ethiopian private investors.

The post-Derg period witnessed a major policy shift from its immediate predecessor. Since 1992/93 the country began to adopt series of economic reform programs aimed at: reorienting the economy from command to market economy, rationalizing the role of the state; creating legal, institutional, and policy environment. The successive and comprehensive reform programs have shaped the private sectors' role in the economy. This period saw comprehensive trade liberalization framework that include reduction in import duties (tariffs) and charges; elimination of quantitative restriction and export taxes; devaluation of the currency; and introduction of a system of export incentives and establishment of export promotion agency. The private sector has been regarded as an engine for growth which has been endowed with the task of organizing and operating business enterprises. To this end, the government attempted to liberalize foreign trade, issue liberal investment laws for the promotion of private investment -domestic and foreign.

[43] The programmes were adopted with the view to stabilise the economy through reducing inflation; stimulate medium and long term growth; enhance private investment; reform tariff; liberalise financial and other prices; and, generally, promote free market competition. It aimed to 'facilitate the transformation of the country from central planning to a market economy'. Afrcian Development Bank Group (2000), *Ethiopian Structural Adjustment Programme Project Performance Evaluation Report ,* Operations Evaluation Department, p. ii. Norman and Stiglize note that while Ethiopia took fast measure to eastablish macroeconomic stability, dismantled collectivised agriculture and established a system of faminine prevention, it acted slowely in other areas, such as financial libralization. Following the introduction of the programme, the economy was growing 10% a year for almost a decade until the 2008 global crises. A. Norman and J. Stiglize, "Economics and Policy: Some Lessons from Africa's Experience", in C. Monga and J. Yifu Lin (2015)(Eds.), The Oxford Handbook of Africa and Economics, Vol. 2, Policies and Practices, Oxford University Press, Oxford, p. 836

A series of five years comprehensive development plans have been designed and implemented during this period. The first of these series of development plans was entitled “Sustainable Development and Poverty Reduction Program (2001/2-2004/5) SDPRP”. Poverty reduction through economic growth was taken to be the principal core objective of the SDPRAP. The program was said to be the result of detailed study about the experience of the country for over a decade before that year. The fundamental development strategy was to build a free-market economic system which will enable:

- The economy develop rapidly,
- The country to extricate itself from dependence on food aid; and
- Poor people to be the main beneficiaries from economic growth.

A major focus of the Program includes:

- Strengthening private sector growth and development especially in industry as means of achieving off-farm employment and output growth (including investment in necessary infrastructure);
- Rapid export growth through production of high value agricultural products

Agriculture was afforded special focus through fundamental strategy entitled “Agricultural Development Leads Industrialization- ADLI” which was justified by comparative advantage in terms of massive cultivable land and productive manpower. The Strategy recognized the key role that the non-peasant private sector agricultural production might play in the economy. The plan expressed the government's commitment to enhance and buttress the contribution of private sector (domestic and foreign) in agricultural development endeavours; allocate land for commercial farming; streamline and make efficient land lease procedures for entrepreneurs who wish to set up large - scale commercial farms.

The second in the series of the development plans was entitled “Plan for Accelerated and Sustainable Development to End Poverty (2005/06-2009/10) PASDEP”. It had particular emphasis on greater commercialization of agriculture and enhancing private sector development. The private sector has been destined to serve as engine of growth. Growth acceleration initiatives were believed to be necessary to eradicate poverty and to achieve required level of growth.

Accordingly, growth acceleration initiatives possess two main thrust, namely, commercialization of agriculture and, accelerating private sector development. One of the strategies in the acceleration of the private sector development was to exploit niche markets which include promotion and expansion of horticulture and floriculture.

The PASDEP was followed by yet another five years development plan which is entitled "Growth and the Transformation Plan 2010/11-2014/15 GTP". The principal goal of the GTP was to extricating poverty and to build a middle-income economy. Once again the agriculture sector was identified as one of the major sources of growth. Fundamentals of the strategy include facilitating the commercialization of agriculture, supporting the development of large-scale commercial agriculture, and the shift to produce high value crops. In the agriculture sector, the plan afforded particular attention to horticulture development, which subsumes floriculture. It expounds the government's commitment to expand and expedite investment in horticulture as stating that "the cluster based development that started in selected areas to expand and expedite investment in horticulture export ventures, particularly those supported by greenhouse technology, will be strengthened".[44]

The government launched "Growth and Transformation Plan 2015-2020" called GTP II with the overarching objective of realizing "Ethiopia's vision of becoming a lower middle income country by 2025". The objective is to achieve an annual average real GDP growth rate of 11 % with rapid industrialization and structural transformation. In relation to agriculture, the plan states that the main focus will be on increasing production and productivity of smallholder agriculture through adoption of improved crop technologies and practices. It also envisages increased investment in

[44] It further states "in order to minimize investment cost, favourable conditions will be put in place to produce greenhouse facilities, irrigation pipes etc. … the necessary activities will be implemented to enhance the role of breeders and seed suppliers in the country, to increase the number of horticulture investors, input suppliers and service providers within the sub-sector and design means of motivation for this purpose". See "Growth and the Transformation Plan 2010/11-2014/15 GTP" document, p. 15. Agricultural development will continue to be the basis for economic growth. The overall targeted growth rate for the sector is 8.6%. Production of major food crops (e.g., teff, wheat, maize) is targeted to increase from 19 million tonnes to 27 million tonnes. Fruit and vegetable production is projected to increase fourfold to 5 million tonnes. This implies increasing crop productivity from 19 quintal per hectare to 22.

medium and large scale commercial farming with enhanced linkages to smallholders using out-grower schemes and contract farming arrangement.

The commitment towards support for the horticulture sector can be said to have been motivated by the fact that the government took cognizance of the need to ease the pressure on balance of payments through promotion and diversification of exports of emerging products like horticulture.[45] It is also driven by the interest to create employment opportunity and mitigate poverty. These two interests are stated among the following specific objectives of investment policy in Ethiopia (Proclamation No. 769/2012, article 5):

- To accelerate the country's economic development;
- To exploit and develop the immense natural resources of the country;
- To develop the domestic market through the growth of production, productivity and services;
- To increase foreign exchange earnings;
- To enhance the role of the private sector in the acceleration of the country's economic development
- To create ample employment opportunities for Ethiopians; and
- To advance the transfer of technology.

The overall objective of investment promotion, which also includes in the floriculture sector, is stated in the Preamble of the Investment Proclamation (No. 769/2012): "to accelerate the economic development of the country and to improve the living standards of its people".

1.3. Factors contributing growth in the industry

Ethiopia is endowed with agro-climatic conditions well-suited for flower production. High altitudes, sufficient and stable hours of sunlight, high daily temperature and cool nights are all favourable for the production of flowers that

[45] GTP document p. 15. The term horticulture incorporates the production of fruits, vegetables and flowers.

customers demand (i.e. large headed robust roses and better quality products).[46] In addition, it has abundant labour supply with low wage rate compared to other African countries.[47] The geographical location of the country, which is relatively proximate to the Middle East and Europe, puts the country on an advantageous position to attract interest of investors who consider the lesser number of hours needed for their produce to arrive destination with relatively lesser transportation cost.

As illustrated in the above sections, the sector registers growth which can partly be attributed to policy measures taken by the government.[48] Foreign owned firms implicate government's supporting policies the major factor, next to climatic condition, persuading them to invest in the Ethiopian flower industry.[49] The broad policy statements have been translated into more concrete measures through incentive such as:[50]

- 100% exemption from import customs duty (and other taxes levied on imports) for investment capital goods and construction materials;
- exemption from customs duties and other taxes for raw materials and packing materials necessary for the production of export goods;
- tax exemption for all goods and services destined for export;

[46] Prabhakar Singh, No Roses Without Thorns: Global Consumers of Cut-flowers as Political Actors, *Agricultural & Natural Resource Law* (2013-14), Vol. 6, No. 1, pp. 23-57; N. van Haren et al (2007), *Trade matters!: the flower industry in Kenya and Ethiopia*, (Amsterdam: IUCN National Committee of the Netherlands and Both ENDS), http://www.bibalex.org/Search4Dev/document/363159 , accessed on 21 August 2015; Balwal and Chala, *supra* note 9

[47] Yukichi Mano and Aya Suzuki (2011), Agglomeration Economies for Industrial Development: The Case of the Ethiopian Cut-flower Industry, Foundation for Advanced Studies on International Development National Graduate Research Institute for Policy Studies, p. 7, http://www.csae.ox.ac.uk/conferences/2011-edia/papers/548-Suzuki.pdf , accessed on 22 October 2015. Since the industry is labour intensive, abundant low-cost labour is considered very attractive for companies in the industry. See The Embassy of Japan in Ethiopia (2008), A Series of Studies in Ethiopia, Study Report on the Floriculture Industry in Ethiopia, Addis Ababa. http://www.et.emb-japan.go.jp/Eco_Research_E.pdf, accessed on 13 August 2015; Balwal and chala, *supra* note 9, p. 222

[48] Mano and Suzuki, *supra* note 47; Singh, *supra* note 46, p. 36; Haug et al, *supra* note 20, pp. 21-22; Melese and Helmsing, supra note 9, pp. 35-66

[49] Gebreeyesus & Iizuka, *Supra* note 6, p. 14

[50] Investment Proclamation No. 769/2012, the Federal Democratic Republic of Ethiopia; Investment Incentives and Investment Areas Reserved for Domestic Investors Council of Ministers Regulation No. 270/2012, the Federal Democratic Republic of Ethiopia.

- 2-8 years income tax exemption depending on the area of investment, the volume of export and investment location; and
- tax exemption on income derived from an expansion or upgrading of existing operation if it exports at least 50% of its products and increases its production by 25%.

Alongside with these favourable investment policies, there is political and macro-economic stability in Ethiopia that attracts investment into the sector. In addition, foreign investors are entitled to remittance of profits and dividend accruing from investment, payment related to technology transfer agreement, and proceeds from the sale or liquidation of enterprise. Investors have easy access to land lease at low prices. Investors are provided generous long-term loans through the Development Bank of Ethiopia which constitute 70 % of the project finance without requirement for separate collateral other than the project itself. [51] Mano and Suzuki found out that 75 % of cut-flower farms gained bank loan, and 45 % of them borrowed from the Development Bank of Ethiopia for initial investment.[52]

The government arranges cultivation of land close to the capital city and the international airport.[53] Land has been leased to the cut-flower farms at around USD 4 per hectare per annum on average, and land near the international airport in the capital city of Addis Ababa leased at less than USD 20 per hectare per annum.[54]

There are also other factors that contribute for the growth of the industry. Ethiopia, classified as least developed country, benefits from tariff-free access to Europe for various product including flowers under the "Everything But Arms (EBA)"[55]arrangement, and to USA under "Africa Growth Opportunity Act (AGOA)".[56]

[51] Haug et al, *supra* note 20, pp. 21-22.
[52] Mano & Suzuki, *Supra* note 47, p. 7
[53] Mano & Suzuki, *Supra* note 47; Gebreeyesus & Iizuka, *Supra* note 47, pp. 8-9
[54] The Embassy of Japan in Ethiopia, *supra* note 47
[55] "Everything But Arms" arrangement (EBA) was introduced in 2001 to give all Least Developed Countries full duty free and quota-free access to the EU for all their exports with the exception of arms and armaments. See http://trade.ec.europa.eu/doclib/docs/2013/april/tradoc_150983.pdf , accessed on 23 October 2015.
[56] The African Growth and Opportunity Act (AGOA), enacted on 18 May 2000, is a United States Trade Act. It aims to enhance market access to the US for "qualifying" Sub-Saharan African countries. The qualifications include actions to improve rule of law, human rights and core labour

Also, the sector received support from different aid organizations.[57] The UK's Department for International Development, for example, assisted the establishment of the Ethiopian Horticulture Producer and Exporters Association. Apart from this, the Netherlands government assists the sector under the Ethiopia Netherlands Horticulture Partnership Programme in various ways such as the development and implementation of a code of practice for the sector, introduction of integrated pest management, capacity building for production managers and agronomists, and market information for key destinations. The code of practice for floriculture and the initiatives to introduce integrated pest management in the industry are discussed in Sections 4.3.3, 6.2.3 and 8.2.2.

1.4. Ethiopian Flower Farms, Export Performance and Job Creation

The Ethiopian cut-flower industry achieved rapid growth after 2003. Until this year, only five farms were engaged in the production and export of flowers.[58] Their number reached 10 in the following year and 67 in 2007.[59] The Ethiopian Horticulture Development Agency (EHDA) reports that there were 84 firms engaged in cut-flower production in 2012 and there is no increase in the number since then.[60] Among these, 50 are foreign direct investments; 10 are joint ventures between foreign and domestic investors; and the remaining 24 are locally owned. Most of the foreign investments come from the Netherlands, Germany, India and Israel. With these investments the country succeeded to become the second largest supplier and exporter of flowers from Africa next to Kenya, which has been one of the major developing country exporters to the European Union.

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standards. The Act was first enacted for 8 years period (until September 2008), but extended to 2015. After completing its initial period of validity, it was further extended to 2025. About 1800 tariff lines were added by AGOA legislation to the previously available duty-free benefits that were under the country's Generalised System of Preferences program. The newly added "AGOA products" include items such as apparel and footwear wine, a variety of agricultural products, chemicals, steel and many others. Additional information about AGOA is available from http://agoa.info/, acceded on 23 October 2015.

[57] Melese and Helmsing, *supra* note 9

[58] Gebreeyesus and Iizuka, *supra* note 6; Mano and Suzuki, *supra* note 47.

[59] Gebreeyesus and Iizuka, *supra* note 6, p. 14

[60] EHDA (2012), *Ethiopian Horticulture Sector Statistical Bulletin*, no. 01. Ethiopian Horticulture Development Agency, October 2012, http://www.ehda.gov.et/

Table 1: Leading developing country suppliers of fresh cut-flowers and foliage to the EU

Country	Euro x million, 2013	Share in Extra-EU imports, 2013	Annual growth '09-'13
Kenya	356	32 %	2%
Ecuador	147	13%	5%
Ethiopia	146	13%	13%
Colombia	111	10%	0%
Costa Rica	38	3%	-7%
Uganda	28	3%	3%
Other developing country suppliers	141	13%	-4%

Source: EurostatComext; calculations LEI.[61]

Area of land used for flower cultivation has been increasing. In 2007/2008 budget year land used was 922 hectares. This reached 1,306 hectares in 2009/10 and 1,442 hectors in 2011/2012 budget year. Furthermore, the country identified and registered in land bank 15,354 hectares out of 130,500 hectares suitable for flower, vegetable and fruit production, in four development corridors.[62]

The industry is providing foreign exchange and employment opportunity. In 2001, the sector's contribution to the economy in the form of foreign exchange was only USD$ 300,000, which increased to 111.7 million in 2007/08 budget year.[63] During 2011/2012 budget year the country earned US$ 212.56 million from the industry. The estimated value expected to have generated during the 2015 was upto USD 535.8 Million.[64] The following table summurizes the quantity of stems that the country exported and the value earned in the form of foregn exchange.

[61] Adopted from: Ministry of Foreign Affairs, The Netherlands, CBI Trade Statistics: Cut-flowers and Foliage, 2015, http://www.cbi.eu/sites/default/files/trade-statistics-europe-cut-flowers-foliage-2014.pdf , accessed on 25 August 2015

[62] EHDA, *supra* note 60, p. 11

[63] *Ibid*., p. 7 Ethiopian budget year starts on July and ends on June (for example, in this case the country earned the specified amount between July 2007 to June 2008).

[64] Yonas Abiye (2014), Ethiopian flower sector: bloomer or gloomier?, *The Reporter*, Local Newspaper, 01 March 2014, http://www.thereporterethiopia.com/index.php/in-depth/indepth-business-and-economy/item/1672-ethiopian-flower-sector-bloomer-or-gloomier , accessed on 14 June 2014.

Table 2: Amount of Cultivate Land, Production in Stems and Value

Year	Developed land (ha)	Quantity (in mill stems)	Value (in mill USD)
2004/2005	-	83.00	12.6
2005/2006	-	186.45	21.97
2006/2007	-	478.04	63.6
2007/2008	922	1,021.52	111.7
2008/2009	1,240	1,294.97	130.71
2009/2010	1,306	1,636.72	170.20
2010/2011	1,300	1,804.70	184
2011/2012	1,442	2,102.11	212.56
2013/2014	-	-	245

Source: Ethiopian Horticulture Development Agency

Despite the increase in export of the volume of cut-flower, there has been doubt among researchers concerning the amount of foreign currency the country actually gained as the result of the increased export.[65] Numerous factors triggered doubts regarding the contribution of the sector in terms of foreign currency which has been desperately needed by the country, among other things, to reduce its balance of payment problems. Flower Companies use foreign currency in order to import the great majority of their inputs such as pesticides, fertilizers and greenhouse supplies.[66] Furthermore, foreign owned companies reserve the right to repatriation into their home countries of the proceeds of their operation in Ethiopia. These factors might significantly reduce the country's potential to actually earn the foreign exchange that the industry generates. On the other hand, the Ethiopian floriculture sector is not unique in terms of the fact that the country's ability to actually earn the foreign currency generated by the industry is far less than the value of export of the industry's produces. One can logically assume that the country may face similar problem in the manufacturing industry as long as products from this industry are destined for export and the industry imports the bulk of its inputs from abroad. Similarly also, foreign investors in the manufacturing sector retain right to expatriation of their capital.

[65] Nour, *supra* note 29; See also Melese and Helmsing, *supra* note 9, pp. 58-60.
[66] *Ibid*.

The industry created job opportunity for approximately 50,000 people.[67] Greenhouses normally employ a number of workers per hectare than does a typical traditional farm, and the 'jobs are much steadier'.[68] The sector provides a source of income for many Ethiopian workers who are both small-scale farm households and labour migrants, and the majority of whom are women. [69] Women are generally preferred as employees by flower farms because it is believed that they can carefully handle flowers that are very delicate which need due attention. Women empowerment through job opportunities and creating a large amount of jobs in rural areas where people mainly live on subsistence farming are seen as great contribution of the sector. Floricultural companies provide relatively permanent employment and wage that can be seen as attractive for the majority of workers. Thus, job creation is taken as "the most direct and biggest impact [of the sector] for the nation". [70]

On the negative side, the floriculture sector is often accused of employing people in sweatshop with poor working conditions.[71] These include lack of proper provision of protective equipment, such as gloves and spray suits; inadequate training about chemical use and safety; reluctance to observe re-entry periods of chemical spraying; inability to form trade unions; and low wage. Normally, the chemicals used in for flower production pose health related risks on those working in greenhouses. The nature of the work is also exploitative and problems are worse where there are poor conditions of work. Not enough is known about labour conditions in the Ethiopian flower industry. Information from scant sources

[67] EHDA, *supra* note 60.
[68] David Tenenbaum, Focus: Would a Rose Not Smell As Sweet? *Environmental Health Perspectives* (2002), Vol. 110, No.5, p. A241
[69] Haug, *et a*l, *supra* note 20, p. 22.
[70] The Embassy of Japan in Ethiopia, *supra* note 47, p. 14
[71] Angela Hale and Maggie Opondo, Humanising the Cut-flower Chain: Confronting the Realities of Flower Production for Workers in Kenya, *Antipode* 37(2): 301–23, 2005, Pan Uk (2009), Flowers: a tale of beauty and the beast, http://www.pan-uk.org/publications/flowers-a-tale-of-beauty-and-the-beast , accessed on 23 June 2015; War on Want (2007), *Growing Pains: The human cost of cut-flowers in British supermarkets*, Press Release, http://www.waronwant.org/media/growing-pains-human-cost-cut-flowers-british-supermarkets , accessed on 20 August 2015; Rachel English (2007*), Promoting Women Workers' Rights in African Horticulture: Overview of research into conditions on horticulture farms in Kenya, Zambia, Tanzania and Uganda*, Manchester : Women Working Worldwide, http://www.womenww.org/documents/www_research_overview_final.pdf , accessed on 20 August 2015; Singh, *supra* note 46, pp. 23-57

suggests that labour conditions are often not as per nationally or internationally accepted standards.[72] Health and occupational safety conditions are said to be poor. Workers encounter different forms of health problems including skin and respiratory problems, headache, irritation of the nose and eye, back pain, kidney problem, dizziness and fainting.[73] It was reported that there are irregularities in providing workers with the necessary personal protective equipment and following rules and safety signs in the majority of farms. Initially the majority of workers were simple day labourers, employed on temporary bases, but these trends are now changing with increased pressure from different sources, such as NGOs and the government. It was reported that the average payment for unskilled labour per day was about 70 USD cents which is not sufficient enough to cover daily expenses.[74] The labour proclamation (No. 377/2003) extends protection for workers against exploitation by establishing minimum labour standards in areas such as health and safety, wage, working hours, freedom of association and collective bargaining. The standards are basically similar with international labour standards found in the ILO Conventions. However, minimum wage is not established in the law and the standards are not fully complied with.

[72] Tewodros Worku (2010), *Promoting Workers' Right in the African Horticulture: Labour Condition in the Ethiopian Horticulture Industry*, NFFPFATU, NFFPFATU/WWW ACTION RESEARCH REPORT; Degytnu T. Gudeta (2011-2012), *Socio-economic and Environmental Impact of Floriculture Industry in Ethiopia*, Thesis, Master of Science in Rural Development, Humboldt University of Berlin (Germany); Atkure Defar and Ahmed Ali, Occupational Induced Health Problems In floriculture workers in Sebeta and surroundings, North Shewa, Oromia , Ethiopia, 2011, *Ethiopian Journal of Health Development* (2013), Vol. 27, No. 1, pp. 64-71; Vegard Mjelde Hanssen, et al, High Prevalence of Respiratory and Dermal Symptoms Among Ethiopian Flower Farm Workers, *Archives of Environmental & Occupational Health (*2015), Vol. 70, No. 4, pp. 204-213

[73] Defar and Ali, *supra* note 72; Hanssen, et al, *supra* note 72.

[74] Nour argues: "the economic benefits in floriculture should [] at least secure the payment of living wages that amount to real income (accommodation, food, medical care, etc.) that can reproduce labour power". Nour, *supra* note 29, p. 51 & 258. Labour costs in Ethiopia is said to be less compared to wages paid for workers in countries with equivalent growing conditions, such as Ecuador. See Ben Taylor (2010), Labor Patterns in Export Floriculture: The Case of the Ethiopian Flower Industry, Prepared for the "*Working for Export Markets: Labor and Livelihoods in Global Production Networks"* conference, 1-2nd July 2010, pp. 6-7.

1.5. Market outlets and access to the World Market

The international trade in floriculture is organised along regional lines with three main consumption centres for flowers: the USA, Japan and Europe.[75] In Japan there is a growing market for flowers and flowers are traditionally demanded for ceremonial occasions like weddings, funerals and similar events. The main exporters are Asia-Pacific countries such as Thailand, South Korea and New Zealand. The US market ranked third in import of cut-flowers. Colombia and Ecuador dominate the market. Even though, African countries export cut-flowers to the USA, the volume of their export is very small.[76] The European main markets are dominated by exports from countries in the Middle East, Africa and Europe. Germany and the UK are the biggest import markets in the EU. Nevertheless, in terms of per capita consumption, the highest consumption is in Switzerland and the Netherlands.[77] Despite the economic crisis that the world had experienced, there is stable market for flower in the Northern European countries. In contrast, consumption volumes in countries, such as Greece, Spain and Portugal have been falling, while there is growing market in Eastern European countries.[78]

The Netherlands is considered as an international marketing hub for cut-flowers.[79] The country mainly imports flowers from East African countries and Israel, and re-exports, alongside with its home grown flowers, to countries mainly in Europe. The Dutch auctions serve as main channel through which flowers are distributed to European wholesalers and retailers. The auctions are co-operative wholesale

[75] Depending on the nature of existing flower markets, countries can be divided into four main categories. The first group has high demand for flowers but largely self sufficient. The USA, Japan, India and China are in this category. Second, there are some countries with high demand and high production for cut-flowers being an importer and exporter; the typical example is the Netherlands. Within the third category, there are countries, such as Germany, UK, France, Italy, Spain, with high demand mainly met by imports. The last group produce primarily for export; examples include such Latin American countries as Colombia, Ecuador and Guatemala. Among African countries Kenya, Ethiopia, Uganda, Zimbabwe, Tanzania, Uganda and Zambia fall within this category. Mano and Suzuki, *supra* note 47, pp. 29-33.

[76] *Ibid*., p. 42

[77] Ministry of Foreign Affairs of the Netherlands, *Tradewatch Cut-flowers and Foliage, CBI Market Information Database*, 2013, http://www.cbi.eu , last accessed December 25, 2013

[78] Groot, *Supra* note 1

[79] Dinham, *Supra* note 2, p. 19

markets established by growers to market their products.[80] Membership is open to all growers in the EU and some growers outside the EU. Most products destined to the auction are sold by means of clock system and are generally purchased by traditional export wholesalers, who supply either to other wholesalers or retailers. Apart from wholesalers, florists from Western European Countries purchase flowers directly at the auctions. Over the past years, the amount of flowers imported to the EU passing through the Dutch auctions has gradually declined as direct sourcing by large retailers is increasing.[81] But still, the Netherlands remained the main gateway for exporters from developing countries as 80% of flowers imported to this country are supplied from developing countries.[82]

Literally, there is no domestic market for Ethiopian cut-flowers. They are mainly grown for export and their destination is European market either via auction (mainly Dutch Actions) or directly to supermarkets and other retailers.[83] The Dutch auctions (particularly FloraHolland) are the major outlet for Ethiopian flowers. In other words, the Ethiopian flower industry is allied with the market in the Netherlands; more than two third of the flowers are destined for this market. As noted above, early entrants used to sale their flowers at this market though they gradually started to supply directly to supermarkets and retailers. In 2007, more than 70 % of floricultural products were exported via the Dutch auctions while less than 20 % of products were sold at auctions in Germany (i.e. Rhein-Maas action) and Japan.[84] However, during the same year, 41 farms involved in direct sale, although the volume sold was insignificant.[85]

In 2012, 83.7 % of Ethiopian flowers were sold in the Netherlands while 5.2 % are sold in Germany.[86] In early 2000s, the number of flowers destination was not more

[80] DLV Plant (2011), *Handbook for Greenhouse Rose Production in Ethiopia*, pp. 11-12, http://www.dlvplant.nl/nl/core/media/file/Handbook_Rose_Ethiopia(1).pdf , accessed on 6 August 2015
[81] *Ibid*., p. 12
[82] Ministry of Foreign Affairs of the Netherlands, *Supra* note 77
[83] DVL Plant, *supra* note 80, p. 9-10; Gebreeyesus and Iizuka, *supra* note 6, p. 20
[84] Gebreeyesus and Sonobe, *supra* note 20.
[85] Gebreeyesus and Iizuka, *supra* note 6, p. 20.
[86] EHDA, *supra* note 60.

than three, which are all in Europe.[87] This reached 56 worldwide in 2008 and about 70 in 2012.[88]

Table 3: The first top ten market destinations for Ethiopian flowers

No.	Market Destination	% Share in Quantity	% Share in Value
1	Netherlands	83.7	83.4
2	Germany	5.2	4.3
3	Saudi Arabia	1.6	2.5
4	Norway	1.8	2.1
5	Belgium	1.2	1.2
6	United Arab Emirates	0.6	1.0
7	France	0.9	0.9
8	Japan	1.0	0.8
9	Italy	0.9	0.8
10	United States	0.9	0.8

Source: Ethiopian Horticulture Development Agency

The table shows the main destinations of flowers produced in the Ethiopian flower industry. The gradual increase of market destinations can indicate the growth of flower export from the country and the increased dependence on export markets.

Conclusion

Floriculture is one of the major export sectors in the Ethiopian Economy. The country attracted substantial investment in floriculture for a number of key reasons including ideal weather and natural conditions for flower cultivation; various incentives, such as easy access to land (with minimal lease payment), tax holidays and tax exemption of inputs; easy access to water resources; cheap labour and proximity to European market. The total area of land covered with flower cultivation which has been less than 100ha in the late 1990's reached 1500ha. In 2013/2014 budget year, foreign exchange earnings from the sector amounted for 245 million USD which is about 10% of the total earnings of the county in the same year. It has been also the country's major source of employment as it provides job

[87] Gebreeyesus and Iizuka, *supra* note 6.
[88] United Nations Statistics Division - Commodity Trade Statistics Database (COMTRADE), 2012, www.comtrade.un.org

opportunity for more than 50,000 people. The country is now the second largest exporter of cut-flowers in Africa.

With the dramatic growth of the industry, however, concerns about its impact on the environment and human health has been raised.[89] This chapter indicated that worldwide the floriculture sector is with bad reputation in relation to employment safety and conditions. Lack of proper provision of protective equipment; inadequate training about chemical use and safety; reluctance to observe re-entry periods of chemical spraying; inability to form trade unions; and low wage are among the dissatisfactions. Other concerns relate particularly with intensive use of pesticides and other inputs, excessive water abstraction and utilization, and poor waste management practices due to lack of know-how and limited regulatory responses. These issues are further elaborated in the up-coming chapters.

[89] Mulgeta Getu, Ethiopian Floriculture and Its Impacts on the Environment: Regulation, Supervision and Compliance, *Mizan Law Review* (2009), Vol. 3, No. 2, pp. 240-270; The Embassy of Japan in Ethiopia, *supra* note 47; Tamiru L. Obole, Ethiopia: Cut-flower Bonanza: At What Cost?, *Jimma Times*, 18 February, 2008; Maggie Murphy, Blossoming Trade Conceals Roots of Exploitation, Earth, Exploitation and Survival, UNPO, available at http://unpo.org/images/blossoming_trade_conceals_roots_of_exploitation.pdf , accessed on 13 August 2015 ; Abiy Tamrat (2011), *Toxication in Bits: Flower Industry Threatens Right to Water in Ethiopia Cut-Flower Production Practices, the Sector's Socio-Economic Contribution and Environmental Standards,* (FIAN Germany), http://www.fian.at/assets/FIANtoxicationinbitsstudyethiopia2011final.pdf , assessed on 24 August 2015

Chapter Two: Floriculture, the Environment and Sustainable Flower Production

Introduction

The preceding chapter provided a general overview of the Ethiopian floriculture industry, and how policy measures and agro-climatic conditions have triggered Investors' interest into the sector. The increasing volume of investment in the floriculture sector has enabled the country to become one of the major flower exporters in Africa to European markets. The benefit of increased investment in the sector can be explicated in terms of the fact that the industry becomes among those sectors that have been major source of employment and foreign currency to the country. The chapter also tangentially touched upon the dilemma facing many developing countries, including Ethiopia, in achieving sustainable economic growth and development through creating employment opportunities for citizens. The present and following Chapters further address this and environmental concerns associated with floriculture and direct investment, in general.

Growth of the floriculture industry engenders considerable debate among policymakers and activists concerning the flip side of the sector such as negative impacts on the environment. The major issues centred on how and to what extent floriculture may affect a host country's environment.[1] The fact that commercial flower cultivation can have negative externality to the environment becomes less disputable. Flowers cultivation involves intensive use of inputs such as fertilizers, pesticides, growth regulators, water, growing structures, packaging materials and energy; which can affect the environment in different ways.[2] The environmental externalities of these activities, in the form of soil degradation, environmental pollution and contamination of freshwater resources, aggravate when the industry

[1] K. R. Gray, 'Foreign Direct Investment and Environmental Impacts- Is the Debate Over?', *RECIEL* (2002), Vol. 11, No. 3, B. Gentry, Foreign Direct Investment and the Environment: Boon or Bane?, in OECD(1999), *Foreign Direct Investment and the Environment , OECD Proceedings,* OECD: Paris, p. 14; L. Zarsky, Havens, Halos and Spaghetti: Untangling the Evidence about Foreign Direct Investment and the Environment, in OECD(1999), *Foreign Direct Investment and the Environment,* OECD: Paris

[2] Abiy Sahle and José Potting, 'Environmental life cycle assessment of Ethiopian rose cultivation', *Science of the Total Environment* (2013), Vol. 443, p. 164; Tanya J. Hall, et al, 'Factors affecting growers' willingness to adopt sustainable floriculture practices', *Hortscience* (2009), Vol. 44, No. 5, p. 4346

operates in the context of loose regulatory control and/or when knowledge lacks regarding optimum use of inputs and waste management practices. This chapter begins with the discussion on major environmental problems linked to flower production. It discusses that huge amount of pesticides with different nature can be applied before plantation and during the growth stages in order to produce flowers that satisfy the market requirement. These, however, can have impact on human health, water resources and the soil. The chapter then proceeds to explain the concept of sustainable flower production and provides examples of good agricultural practices that can help to mitigate impacts on human health and the environment. Discussion is made in this chapter about major factors that might restrict growers from adopting the practices.

The discussion on sustainable flower production is included in this chapter for two reasons. First, as there are negative externalities associated with commercial flower production, there are also co-existing developed alternatives that can help to mitigate impacts. These have to be equally presented. Second, countries such as Ethiopia need to promote investments in sectors like floriculture in order to bring about economic growth and alleviate poverty. Thus, discussion on the environment and investment balance in the sector can help countries to design their policies in such a way that they should protect natural resources while reaping the economic benefits from the investment opportunity. It is also part of the effort to bring to attention the challenges associated with implementation of sustainable flower production methods in developing countries where there are limited capabilities (financial, institutional and expertise) to employ and legally enforce the methods.

2.1. Commercial Flower Cultivation and the Natural Environment

Large scale commercial flower production involves complex interaction with the environment which is often different from other agricultural activist. For example, the condition, i.e. greenhouse, which flowers are cultivated in, creates conducive environment for pest outbreak necessitating excessive application of chemical

pesticides.[3] Moreover, Greenhouse-based production is generally known to use extensive amount of inputs such as water and energy, and generates substantial amount of waste.

In the Ethiopian context, the effect of floriculture development on the environment can best be addressed in light of rose production as the majority of flower growers in the country are engaged in rose cultivation. In 2008, for example, rose was cultivated on 82 % (990 ha) of the total amount of land (1200 ha) covered with flowers.[4] There are three major stages in rose cultivation that farmers need to undertake: plant growth management, post-harvest handling and transportation.[5] The first stage, plant growth management, starts with planting-up and ends with harvesting rose stems. Commercial roses are mostly cultivated in greenhouse and this provides the benefits of climate management through, for example, controlling wind, rain, levels of radiation, temperature, CO_2, and humidity.[6] There are two major rose growing systems: soil based and hydroponics.[7] The soil based system dominates rose production in Ethiopia. In this system, the soil is normally ploughed up before the new rose is planted, which is followed by harrowing. Compost, peat or other organic matter can be added in order to improve the soil structure and fertility. Several weeks before planting, the soil can be disinfected (using steam or chemical) to reduce the presence of pests. After plantation on prepared beds, water and nutrients are made available through an automated fertigation system.[8] Pesticides are also used to control pathogens and insect pests either by direct

[3] Gabriela Perdomo (2011), 'The Cannibal Killers Behind the Perfect Rose', *The Tyee*, http://thetyee.ca/News/2011/05/18/CannibalKillers/ , accessed on 12 May 2015; Pan Uk (2009), *Flowers: a tale of beauty and the beast*, http://www.pan-uk.org/publications/flowers-a-tale-of-beauty-and-the-beast , accessed on 23 June 2015; Prabhakar Singh, 'No Roses Without Thorns: Global Consumers of Cut-flowers as Political Actors', *Agricultural & Natural Resource Law* (2013-14), Vol. 6, No. 1, pp. 23-57

[4] Sahle and Potting, *supra* note 2, p. 164

[5] *Ibid*.

[6] DLV Plant (2011), *Handbook for Greenhouse Rose Production in Ethiopia*, p. 38, http://www.dlvplant.nl/nl/core/media/file/Handbook_Rose_Ethiopia(1).pdf, accessed on 6 August 2015. Through selecting the right type of greenhouse and equipment, it is possible to cultivate roses at any part of the world.

[7] See Section 2.2.2 for the discussion on the difference between soil-based cultivation and hydroponics.

[8] DLV Plant, *supra* note 6, p. 39. Fertigation refers to the technique of supplying dissolved fertilizers to the crop through an irrigation system. *Ibid*., p. 55

application to the plant or systemically through an irrigation system. The rose plant normally reaches the stage of harvesting only after passing through all the processes described above.

After harvesting the cut-roses are transported to either a cold room for pre-cooling or are directly stored, graded and packed in pack house. [9] They will be put in post-harvest solution that helps to keep the flower hydrated and have long vast life.[10] Farms usually bunch either 20 or 10 rose stems together for shipment depending on their specific market requirements where flowers that are below the standard are rejected. [11] Flowers which are packed and stored in cold rooms go through the third stage of the process, transportation from farm to international airport. This is normally carried out by cold truck to maintain flower quality.

The overall energy consumption for rose cultivation in Ethiopia is low compared to what is required in countries in the temperate climate zone such as the Netherlands where extra energy is used for heating and lighting purposes. [12] Moreover, most floricultural companies in Ethiopia are found within 200 km radius around the capital city, Addis Ababa, where the international airport is located. [13] These can help to reduce fuel consumption and associated emission of Co_2 to the environment. Accordingly, it is the stages of plant growth management that involve consumption of pesticides, fertilizers, water and energy that contribute more to

[9] *Ibid*., p. 101

[10] Various post-harvest chemicals are added to the solution to promote water uptake and provide nutrients. Some of these include: aluminium sulphate, chlorine, citric acid, sugar and silver thiosulphate. *Ibid*., p. 104-105

[11] Sahle and Potting, s*upra* note 2, p. 164. Depending on the variety and the area where they are grown, rose plants produced for the cut-flower market have a life cycle of 5 to 10 years. Flower quality declines as the age of the plant increases that leads to replacement of the old with new and young plant.

[12] The ideal day temperature for rose production is between 20 to 25^{o}C while the night temperature ranges between 15 to 18^{o}C. In the Netherlands, these levels of temperature are common during summer season. But during winter, unless extra energy is used, only few or no rose can be produced. See Willem de Varies (2010), Qualitative comparison of Dutch and Ethiopian rose production systems: *Why Dutch rose growers move to African nations and what consequences does this migration have?,* MSC Thesis, University of Groningen

[13] The companies are concentrated in five principal cultivation areas: Ziway, Debre Zeit, Sebeta, Holleta and Sundafa. However, there are some companies established out of 200 km radius of Addis Ababa, in Amhara Regional State around Lake Tana, in Tigray Regional State, and South Nations and Nationals Regional State.

environmental problems. [14] The negative environmental impacts of the process are relatively small during post-harvesting and product transpiration stage.[15]

2.1.1. Pesticides and Agro-chemicals

Pesticides are chemicals used in connection with agriculture and public health for the control of pests, insects, rodents, fungi, unwanted plants, plant diseases, organism and vectors.[16] The term is defined in the International Code of Conduct on Pesticide Management as 'any substance, or mixture of substances of chemical or biological ingredients intended for repelling, destroying or controlling any pest, or regulating plant growth'.[17] There are diverse group of chemicals with varying purposes, properties and use- patterns within the realm of 'pesticides'. Several insects, fungi, molluscs, and bacteria attack crops causing production losses. Pesticides are thus used throughout the world with the aim to minimize qualitative and quantitative yield-loss.[18]

Similarly, a significant volume of pesticides are in use in the floriculture industry.[19] There are various kinds of pests that affect the growth and productivity of cut-flowers. In 2006, a survey was conducted to identify major pest-problems in the Ethiopian rose production which identified eleven types of pests.[20] According to this survey, spider mites and powdery mildew have been most common problems during the dry season, while downy mildew and botrytis have remained problems in

[14] Sahle and Potting, *supra* note 2
[15] *Ibid*., p. 168
[16] WHO, *Pesticides*, http://www.who.int/topics/pesticides/en/ , accessed on 18 August 2014
[17] FAO and WHO(2014), International Code of Conduct on Pesticide Management, Rome, P. 6, http://www.fao.org/3/a-i3604e.pdf , accessed on 18 August 2015
[18] WHO (1990), *Public Health Impacts of Pesticides Used in Agriculture,* WHO: Geneva, pp. 20-21, http://apps.who.int/iris/bitstream/10665/39772/1/9241561394.pdf , accessed on 20 December 2014; See also A. Leadbeater and U. Gisi, ' The Challenges of Chemical Control of Plant Diseases' in: U. Gisi, *et al* (eds.) (2010) *Recent Developments in Management of Plant Diseases,* Springer Science + Business Media B.V.
[19] M. Pizano (2001), *Floriculture and the Environment: Growing Flowers without Methyl Bromide,* UNEP: Nirobi, p. 17
[20] These were red spider mite, two-spotted spider mite, thrips, downy mildew, botrytis, caterpillars, Aphids, black spot, agro-bacterium and cut warm. See DLV Plant, *Supra* note 6, p. 63

wet season. Gradually, other types of pests, such as whitefly, mealy bug and nematodes, were also identified.[21]

The majority of flowers are being grown in tropical countries and exported to countries in the temperate zone that have established stringent phytosanitary standards in order to avoid entry and spread of pests into their territories.[22] Customers also demand high quality flowers which are not affected by pests and diseases. Since roses are used as decorations, they have to be free from spots and small insects when retailed. Because of these, all crop protection measures are taken seriously. There are a wide range of preventive and curative measures that include growing resistant or tolerant variety, humidity control, good sanitation, release of predators, removal of infected plants and spraying chemicals.[23] However, in the majority of cases, enormous volume of pesticides is being used to control pests.[24] As Perdomo explains:

> Growing flowers on massive scale is inherently unnatural. Floral monocultures attract more pests like spider mites in bulk than a variety of crops grown in the same parcel. Hence you also need more and stronger pesticides to control them….The norm in any conventional farm is to spray chemicals on the flowers and soil for eight hours a day.[25]

Since flowers are not edible and not much attention had been paid for visual perfection, concerns over pesticides emerged slowly.[26] Nevertheless, the application of different chemical products for flower cultivation is inherently dangerous as there are poor implementations of pesticide regulations and lack of awareness about pesticide application and handling in producing countries.[27] 'Low-cost but highly contaminating' chemicals are used during cultivation and post harvesting of cut-

[21] *Ibid.*
[22] *Ibid.*
[23] See Section 2.2.1 in this chapter
[24] Perdomo, *supra* note 3; Singh, *supra* note 3, pp. 23-57
[25] Perdomo, *supra* note 3
[26] Pan UK, *Supra* note 3.
[27] *Ibid*., Singh, *supra* note 3, p. 30.

flowers.[28] Though customers can be exposed to tiny amount of harmful chemicals, because of dripping of cut-flowers in fungicides immediately before shipment, it is those who cultivate, harvest and pack flowers that are most vulnerable to the problem.

Pesticides that were found to be problematic from an environmental viewpoint have been banned and others are regulated to minimize risks; however, they continued to be in use in developing countries.[29] Early reports indicate that many older, non-patented, more toxic and environmentally persistent chemicals are being used extensively in these countries, causing serious health problems and environmental contamination. [30] More toxic pesticides are still applied and poorly handled in Africa both in large and smallholder farms.[31] In less developed nations, the prevalence of pesticide poisoning is high due to the kind of pesticides that are being used (usually high or moderately toxic classes), excessive use of pesticide, lack of knowledge about proper handling, poor quality formulations.[32] Though regulation can play role in controlling the use pesticides, lack of effective regulatory system is major aggravating problem in these countries as discussed in detail in Chapter Five.

2.1.1.1. Environmental and Ecological Impacts

Though the significant contribution of pesticides and fertilizers in raising agricultural productivity is well established, their use can have negative effects both on the

[28] Singh, *supra* note 23, p. 30.
[29] *Ibid*. See also David Tenenbaum, 'Focus: Would a Rose Not Smell As Sweet?' *Environmental Health Perspectives* (2002), Vol. 110, No.5, pp. A240–A247
[30] Among these banned pesticides are three herbicides (butachlor, haloxifop, and nuarimol) and two insecticides (prothiophos and DDT). See Leticia Yáñez, *et al*, 'Overview of Human Health and Chemical Mixtures: Problems Facing Developing Countries', *Environmental Health Perspectives* (2002), Vol. 110, Sup. 6, pp. 901-909; Lynn Goldman and Nga Tran (2002), *TOXICS AND POVERTY: The Impact of Toxic Substances on the Poor in Developing Countries*, World Bank: Washington, D.C.
[31] Even if the use of pesticides appears to be lower in Africa, farmers and communities in this continent could be the most exposed due to lack of adequate protective equipment and knowledge, which directly relate to literacy and poverty. Stephanie Williamson, 'Understanding the Full Costs of Pesticides: Experience from the Field, with a Focus on Africa' in Margarita Stoytcheva (Ed.) (2011), *Pesticides - The Impacts of Pesticides Exposure* (In Tech), pp. 25- 48, http://www.intechopen.com/books/pesticides-the-impacts-ofpesticides-exposure/understanding-the-full-costs-of-pesticides-experience-from-the-field-with-a-focus-onafrica, accessed on 30 April 2015
[32] Yáñez, *et al, Supra* note 30, p. 903; Goldman and Tran, *Supra* note 30

environment and human health.[33] The understanding about the reaction and behaviour of pesticides and other chemicals in the environment was obtained by retrospective analysis of soil, water, sediment, air, plants and animals after they have been used for many years.[34] It is now known that the use of some chemicals as soil nematicides can affect groundwater in the use areas while others threaten some aquatic and terrestrial animals because, by their nature, they are chronically toxics and can undergo bioaccumulation. Some chemicals are found to be exceptionally stable in the atmosphere and play part in the destruction of ozone layer.

When a pesticide is applied purposefully, released accidentally or disposed in a form of waste, it gains entry to one of the environment compartments (i.e. air, soil, water, and biota).[35] Once applied to the soil, it may be washed off into nearby bodies of surface water or permeate through the soil to lower layers and ground water. Pesticides with insoluble nature tend to settle to the bottom of surface water bodies or preferentially stick to the soil.[36] Some chemicals are stored in fatty animal tissues and lead to bioaccumulation. This refers to an increase in the concentration of a chemical overtime in a biological organism. The effects of pesticide on living organisms include: reduced rates of survival or increased death rates, reduced growth and altered development, reduced reproductive capabilities, birth defects and changes in body systems.[37] All these can influence a species' ability to adopt and respond to other environmental stresses. Ecological losses in turn have economical, aesthetical or social implications.

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[33] WHO, *supra* note 18; G. Matthews (2006), *Pesticides: Health, Safety and the Environment,* Oxford: Blackwell Publishing, Frank den Hond *et al*, 'Questions Around the Persistence of the Pesticide Problem', in Frank den Hond *et al* (2003), *Pesticides: Problems, Improvements, Alternatives,* Oxford: Blackwell Publishing, pp. 1-15; Michael A. Kamrin (2000), *Pesticide Profiles: Toxicity, Environmental Impact, and Fate*, Boca Raton: CRC Press.

[34] J. N. Seiber, Environmental Fate of Pesticides in Willis B. Wheeler (ed.) (2002), *Pesticides in Agriculture and the Environment,* New York: Marcel Dekker.

[35] *Ibid.,* Kamrin, *supra* note 33

[36] Examples include DDT, toxaphene and the cyclodienes, which are absorbed to and are stabilized in soil organic matters. *Ibid*.

[37] For example, a pollutant can cause loss of fish production in a lake or may promote the dominance of undesirable species. Toxic pollutants and other non-natural phenomena can overwhelm the natural stability of an ecosystem, resulting in irreversible changes and serious losses. *Ibid*.

After application, chemicals may be degraded by the action of sunlight, water, other chemicals or microorganisms, and pose less serious threats to humans or the environment.[38] However, this is not always the case, and there may be minor transformations. The challenge remains in keeping pesticides confined to their intended targets with very limited movement in surface and groundwater as well as air.[39]

Fertilizers add nutrients to the soil that are important for plant growth and used in agriculture to increase productivity. However, excessive and improper use of fertilizers can cause harm to the environment. All fertilizers applied into the soil cannot be absorbed by crops.[40] The excess and residues may find their ways to water resources and cause pollution, eutrophication of fresh waters, and increase nitrate concentrations both in ground and surface waters. Long-term use of inorganic fertilizer can also has detrimental impact on the soil by destroying nitrogen-fixing bacteria and other useful organisms. The use of fertilizer nutrients is extremely high in the floriculture industry due to high demand and year-round production of cut-flowers.[41] The thesis, in Chapters Seven and Eight, discusses that one of the major threats for soil and water resources emanates from fertilizers applied during flower cultivation. Yet the future of environmental protection in Ethiopia may depend on the careful analysis of chemicals and their use for production.

2.1.1.2. Impacts on Human Health

Concerns about the effects of pesticides on human health have been articulated.[42] Their widespread use causes health problems often as a result of occupational exposure and accidental poisonings. Exposure mainly happens during handling, dilution, mixing and application. Those working in greenhouses and engaged in

[38] *Ibid*; Seiber, *supra* note 34.
[39] *Ibid.*
[40] Nina Hatch & Lindley Wells, 'Multilevel Environmental Governance -The Case of Ethiopian Floriculture' in Colby Environmental Policy Group(2012), *Environmental Policy Update 2012: Development Strategies and Environmental Policy in East Africa,* Waterville, Maine: Colby College Environmental Studies Program, http://web.colby.edu/eastafricaupdate2012/key-issues-in-ethiopia-2012/chapter-2/ , accessed on 10 March 2015
[41] *Ibid*.
[42] See WHO, *supra* note 18; Kamrin, *supra* note 33; See also Williamson, *supra* note 31.

spraying are the most exposed to pesticides. Greenhouses are closed, plastic-covered environments. Conventionally, spraying is a one-man job and it is carried out every day.[43] In most cases, greenhouses are opened for other workers just a few hours after being sprayed.[44] Employees work either in greenhouse or packaging room where chemical substances linger on. Also workers come into contact with pesticides during flower harvesting where deposits remain on foliage.

Workers' exposure to pesticide-related problems can be aggravated where there are poor working conditions. If workers are ordered to inter greenhouses while spraying take place, as reported in the case of Kenyan floriculture sector, or if there are reluctances in observing greenhouse re-entry periods, the health related risk will be high.[45] Jaime Breith, an epidemiologist from Ecuador, noted that

> We had a lot of testimony from workers saying there is never a delay for re-entry [into the greenhouse] after fumigation. We saw it, workers were going in and out. At a supposedly good greenhouse, there was a sign saying 'two hours delay' but some workers were telling us that in other greenhouses they are spraying while workers were inside.[46]

Lack of adequate personal protective equipment (PPE) and information about chemical use and safety are other key factors that worsen exposure of workers to pesticide poisoning.

Similar health problems on greenhouse workers were reported from different flower producing countries. In Ecuador, a study found out that nearly 60% of

[43] Perdomo, *supra* note 3; see also Angela Hale and Maggie Opondo, 'Humanising the Cut-flower Chain: Confronting the Realities of Flower Production for Workers in Kenya', *Antipode* (2005), Vol. 37, No. 2, pp. 301–23

[44] *Ibid*.

[45] Hale & Opondo, *supra* note 43, p. 312. It is reported that a survary was conducted on 84 farms in Colombia and only 16.7% of farms respected pesticide manufacturer's recommendation to keep workers away for 24 hours from greenhouse after spraying the most toxic pesticides. See Pan Uk, *supra* note 3.

[46] Jaime Breith, epidemiologist, Ecohealth Project of the Health Research and Advisory Centre in Quito, in David Tenenbaum, Focus: Would a Rose Not Smell As Sweet? *Environmental Health Perspectives* (2002), Vol. 110, No.5, p. 243

greenhouse workers show a very high neurotoxin impact with symptoms including headaches, dizziness, hand trembling, and blurred vision. [47] Similarly, a study by the Colombian National Institute of Health found high rate of miscarriages, premature births, and congenital malformation among greenhouse workers.[48]

The general population may also be exposed to residues of highly hazardous pesticides.[49] As some pesticides are persistent, once they contaminate the environment, they can be found in foods and water bodies, resulting in human exposure through consumption. Residues may accumulate in fish and aquatic organisms, posing threat to human health. These kinds of long-tem exposure to low doses of chemicals are not often easily detected and quantified.

2.1.2. Water Consumption

The impact of flower cultivation on water resources can be seen from two perspectives. First, intensive use of pesticides and poor waste management practices can lead to direct and/ or non-point pollution.[50] There will be direct pollution when liquid wastes, contaminated with chemicals, are discharged into streams or other water bodies. Non-point source pollution is caused as runoff carries away natural and human-made pollutants and deposits them into lakes, rivers, wetlands and underground sources of water. It is a common practice among flower farms in developing countries to release waste contaminated with fertilizers and pesticides into nearby water bodies. [51]

Second, a huge amount of water is required to grow flowers for commercial purposes. Roses, in particular, are described as 'water loving plants'.[52] Kenya's

[47] Pan Uk, *supra* note 3
[48] *Ibid*. See also Tenenbaum, *supra* note 29, pp. A240–A247
[49] H. Hengsdijk and H. Jansen (2006), *Agricultural development in the Central Ethiopian Rift valley: A desk-study on water-related issues and knowledge to support a policy dialogue,* Wagningen: Wagningen University.
[50] Brain A. Krug, et al, 'Growers look at operating a sustainable greenhouse', *GMPRO* (2008), pp. 43–5, https://ag.purdue.edu/hla/lopezlab/Documents/ExtPubs/Sustainability_GM1008.pdf , accessed on 17 March 2015
[51] Singh, *supra* note 3, pp. 30-31
[52] de Varies, supra note 12, p.16; N. van Haren, et al (2007), Trade matters!: the flower industry in Kenya and Ethiopia, Amsterdam: IUCN National Committee of the Netherlands and Both ENDS, http://www.bibalex.org/Search4Dev/document/363159 , accessed on 21 August 2015

second largest freshwater lake, Lake Naivasha, is usually cited as an example to show the impact of flower cultivation on water resources. Kenya has been the leading African country and the world's fourth largest exporter of cut-flowers.[53] The industry provides employment and infrastructure such as school and hospital for a number of people.[54] A substantial number of flower farms are established near Lake Naivasha and depend on its surface water for flower cultivation. About 95% of Kenya's flower export comes from the area around this lake.[55] It is estimated that the amount of water that companies extract from the lake can reach at least 20,000 cubic metres a day. [56] The maximum depth of the lake in October 2007 was only 3.7 meters, more than 3 meters below what it was in 1982. In the same year, the total area of the lake shrank to about 75 % of its size in 1982. The lake has also been experiencing severe environmental problems due to pollution from agricultural effluents, improper land use practices in the catchment area, and proliferation of wetlands' invasive species. [57] The decline in the lake level is attributed mainly to the commercial flower farms around the lake while both commercial farms and smallholder farms in the upper catchment are made responsible for the pollution of the lake due to nutrient load.[58]

In Ethiopia, surface water, borehole water and rain water are used for flower cultivation.[59] Chapter Six discusses in detail the cases of two Ethiopian lakes with the objective to show the level of threat commercial cut-flower production can pose on water resources. Research findings reveal that limitations with regulatory frameworks are leading to overconsumption and pollution of water resources. [60] This is an important issue to consider in Ethiopia as the country has been experiencing recurrent droughts followed by food shortages and famines.

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[53] Singh, *supra* note 3, p. 34.
[54] van Haren, *et al*, supra note 52.
[55] M. M. Mekonnen, *et al*, 'Mitigating the Water Footprint of Export Cut-flowers from the Lake Naivasha Basin, Kenya', *Water Resources Management* (2012), Vol. 26, Issue 13, p. 3731
[56] Ochieng Ogodo and John Vidal (14 January 2007), Drained of Life, *The Guardian*, http://www.theguardian.com/society/2007/feb/14/kenya.conservation , accessed 20 August 2015
[57] Singh, *supra* note 3, p. 34
[58] Mekonnen, *et al*, *supra* note 55, pp. 3725–3742
[59] DLV Plant, *supra* note 6, p. 39
[60] Haren, *et al* note that 'flower production is, as many other agricultural practices, a water thirsty sector and it competes with other water uses, including other agricultural activities, domestic water supply and ecosystem requirements'. van Haren, *et al*, *supra* note 52, p.11

2.1.3. Waste Management Issues

Greenhouse production requires the use of large amount of water and agrochemicals and it usually generates huge quantity of waste.[61] Both liquid and solid wastes are generated from greenhouse based flower cultivation, presenting significant waste disposal for the floriculture industry. The major sources of solid waste are pesticide containers, discarded packaging materials and plastic film (polyethylene) used to cover greenhouses.[62] The life time of plastic film ranges from some months to 3-4 years.[63] Prolonged exposure to solar radiation, wind, high air temperature and agro-chemicals reduces the useful life of plastic film through degradation. This results in the generation of huge quantities of plastic wastes. Since in most cases the waste is contaminated with soil and agro-chemicals, the recycling process is time-consuming and expensive. Because of this, plastic waste is often burned in uncontrolled condition or left on open field.[64] Yet, by applying UV stabilizers on greenhouse plastics, it is possible to extend their life time and reduce the amount of post-use plastic wastes.[65] There are also biodegradable alternatives in use to replace the synthetic polyethylene.[66]

Foliages (trimmed from growing plant or from flower stick to reduce height), rejected flowers due to low quality, and old removed plants are other forms of wastes from floricultural companies. These organic wastes can decompose by the action of micro-organisms to form organic fertilizers or can be used as feedstock for biogas production.[67] However, unless properly managed, they can pollute the environment or cause health hazards as some residues of pesticides can be found on them.

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[61] Giuliano Vox, *et al*, "Sustainable Greenhouse Systems", in A. Salazar and I. Rios (eds.), (2010), *Sustainable Agriculture: Technology, Planning and Management*, Nova Science Publishers, pp. 1-80.
[62] Krug, *et al*, *supra* note 50, p. 43
[63] Vox, *et al*, *supra* note 61, p. 32
[64] *Ibid*., p. 28
[65] *Ibid*., p. 34
[66] At the end of their life time, these materials can be integrated directly into the soil where bacteria flora transforms them in carbon dioxide or methane, water and biomass. They can also be blended with other organic material to generate carbon rich composts. *Ibid*.
[67] Tamrat Asnake (2008), *Potential of Floriculture Residue for Biogas Production*, MSC Thesis, Environmental Science Program, Addis Ababa University, Ethiopia, pp. 32-33

Empty pesticide containers present serious public health and environmental concerns. If containers are stored in open areas where people can get access, they can be reused for household purposes, leading to toxic substance exposure. Spills and leaks from containers can find their way into surface water from run off or into groundwater from leaching through soil.

Liquid wastes from greenhouse-based flower production concerns mainly effluent and wastewater from flushing drip-lines or cleaning spraying equipment. These are normally loaded with pesticide and fertilizer residues and, unless treated well, they can contaminate soil, ground water and surface water. This has been a serious problem in Costa Rica where effluents containing pesticide residues were directly discharged into waterways and pesticide equipment were washed into streams and rivers.[68]

2.2. Sustainable Flower Production

The worldwide increase in the area covered by greenhouses gradually lead to the emergence of the concept called sustainable agriculture production. This is concerned with production methods that aim at reducing environmental degradation, maintaining agricultural productivity, promoting economic viability, conserving resources and energy, and maintaining stable communities and quality of life.[69] This can be achieved through different cultivation techniques, adequate equipment management and innovative methods geared towards reducing agro-chemicals, water consumption, waste generation and energy use.[70] In light of these methods, Vox, et al point out the following means[71]:

- Efficient management of climatic parameters in order to guarantee suitable growing condition for the crop and energy saving
- The use of renewable energy sources in place of fossil fuels

[68] David Tenenbaum, Focus: Would a Rose Not Smell As Sweet? *Environmental Health Perspectives* (2002), Vol. 110, No.5, p. A246
[69] Krug, *et al*, *supra* note 50, p. 43
[70] Vox, *et al*, *supra* note 61.
[71] *Ibid*., p. 3

- The use of innovative greenhouse covering materials with suitable physical properties and low generation of after-use waste
- The optimization of water and nutrient delivery to the plant in order to reduce water and nutrient consumption and drainage with ground water and soil preservation
- The integrated management of pests and diseases with a significant reduction of agrochemicals.

As Lichtfouse, *et al*, note "agricultural systems are considered to be sustainable if they sustain themselves over a long period of time, that is, if they are economically viable, environmentally safe and socially fair".[72] The term "sustainable" is thus used to refer to the possibility of maintaining production over a long period by protecting productive resources, i.e. maintaining soil fertility, protecting groundwater and surface water, and developing renewable energies.

Sustainable production practices are particularly important for environmental protection as they create circumstance that enable substances which are potential contaminants and toxic to soils, water, air and living organisms, such as pesticides and fumigants, to be used in far lower quantities.[73] The techniques, in turn, enable to mitigate pollution and better preserve natural resources. The following subtopics present some of these methods particularly related to flower production.

2.2.1. Biological Control as an Integrated Pest Management

The concept of integrated pest management (IPM) was developed as a means of improving the efficiency of pest control while at the same time keeping the cost and environmental damage of the pest control methods to a minimum.[74] It encompasses different approaches towards pest and disease control that basically depend on the grower's knowledge and effort to gather information about the nature of pests, their life cycle, the environmental conditions suitable for their

[72] E. Lichtfouse, *et al*, Agronomy for sustainable agriculture. A review, *Agronomy for Sustainable Development*, Springer Verlag/EDP Sciences/INRA, 2009, 29 (1), p. 3
[73] Pizano, *supra* note 19, p.24
[74] WHO, *supra* note 18

development and varieties of crops susceptible or resistant to pests.[75] Based on these findings and by taking into account local conditions and pest occurrence, a full-fledged program with pest or disease reduction is developed. IMP involves all possible mechanisms, not just chemical control, to reduce and prevent the incidence and effect of a given pest. [76]

IPM propagates the use of all available resources in a rational way to control and prevent the presence and effect of a particular pest or disease.[77] Though control of plant disease has traditionally relied on the use of chemical pesticides, which has been effective in controlling pests for more than a century, different approaches and methods are developed through time.[78] Each one of these methods will contribute in achieving better control over pests. One of these is biological pest control method and, in this method, bio-control agents (i.e. viruses, bacteria, fungi, and insects) are released to control plant pathogens and pests or reduce their amount and effect.[79] In other words, it involves the controlled release of insects or animals that consume pests without affecting the crop.

Biological control methods have been proven to be very effective, particularly, concerning the control of several insect pests with natural predators.[80] The

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[75] Pizano, *supra* note 19, p.24

[76] *Ibid*., pp. 24-25; WHO, *supra* note 18, p. 30. IPM involves monitoring or scouting overseeing of the crop to detect symptoms or actual presence of a pest or disease that is known to cause problems in the flower crop. IPM requires growers to collect and use essential information on pests and diseases that include identifying the causal organisms (fungi, insects, nematodes, etc); how their life-cycle takes place; how they disseminate and produce; the optimum environment for their reproduction, and what varieties are most susceptible. See UNEP (2014), *Phasing-out Methyl Bromide in Developing Countries: A Sucess Story and Its Challenges ,* Nairobi: UNEP, pp. 29-30

[77] *Ibid*.

[78] Paul C. Struik and Martin J. Kropff, 'An Agricultural Vision', in Frank den Hond *et al (Eds.)*(2003), *Pesticides: Problems, Improvements, Alternatives*, Oxford: Blackwell Publishing, pp. 16-30; J. Postma, 'The Status of Biological Control of Plant Diseases in Soilless Cultivation', in Ulrich Gisi, *et al* (eds.), (2009), *Recent Developments in Management of Plant Diseases,* Springer Science + Business Media B.V., pp. 133; Leadbeater & Gisi, *supra* note 18, p. 7

[79] Postma, *supra* note 78, p. 140; R. Charudattan, *et al*, 'Biological Control', in Willis B. Wheeler (ed.) (2002), *Pesticides in Agriculture and the Environment,* New York and Basel, Marcel Dekker.

[80] Leadbeater & Gisi, *supra* note 18, pp. 6-7; Charudattan, *et al*., *supra* note 79. Similar kinds of benefits are raised by advocates of genetically modification (GM). The technology can offer improvements in variety that resist insects, pathogens, stress and postharvest deterioration. Accordingly, it can help to elliminate the use chemicals in flower production. It may also help to create new flower colours or modify the pattern of flower colors. The technology, however, involves significant costs and genetically modified floricultural products may not get acceptance by the public and in retail trade. See Sam Savage (2007), Genetic Modification in Floriculture, 31 August

methods are successful under right conditions and advantageous from different perspectives. One of these is the host specificity of biocontrol agents; they are less likely to inflict damage to non-targets.[81] As biocontrol agents are living organisms, they are subject of mortality and less likely to build up in nature and cause environmental damage. They are only capable of multiplying when more food is available in the form of host and their number decreases with food decline. Because of this, cost is said to be incurred at the initial phase of introduction, except where annual or periodic applications of biocontrol agents are needed. In addition to this, biological controls provide environmental advantages.[82] They allow time for the ecosystem to readjust by acting more slowly than chemical pesticides. Accordingly, there will be only a gradual ecological change as the pest and disease problems are controlled.

Biological control methods can be effectively used to control pests that affect flower quality and productivity.[83] For example, one of the most common types of pest problem in rose cultivation, spider mite, can be controlled by predatory mites (*phystoseiulus persimilis* and amblyseius californicus). In relation to this, Chapter Seven discusses the experiences of companies in the Ethiopian flower industry.

However, there are some drawbacks with biological agents. Since they are generally host-specific, each agent is normally active against a single pest species or disease. Therefore, the user who is faced with several different pests need to resort to many different biocontrol agents, seek several supplementary control methods or use a broad-spectrum of pesticide that will control all of the pests. Another challenge with using biological agent is their susceptibility to damage if pesticides, which will

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2007, www.redorbit.com , accessed on 27 June 2016. Anderson and Walker note "a limited array of GMO cut-flower cultivars exist in the floral markets worldwide: nine carnations and one rose". See N. O. Anderson and N. J. Walker, Marketing Genetically Modified Organism Carnations by Future Floral Designers: Student-designed Policy Formulations, *HortTechnology* (2013), Vol. 23, No. 5, pp. 683. Though this is a recommended future area of study, the issue is out of the scope of this research.

[81] Charudattan, *et al*., *supra* note 79

[82] *Ibid*.

[83] DVL plant, *supra* note 6

be applied to control other types of pests, are in use. [84] Some of these challenges have been faced by companies in the Ethiopian flower industry and can cause setbacks on industry wide implementation of the methods. Details are provided in Chapter Seven.

2.2.2. Soilless Growing System (Hydroponic)

There is continuous change in agriculture due to rapid scientific, economic and technological development.[85] The rise in the worlds' population and improvement in living standards increased the demand for high-value foods and ornamentals, including out-of-season high-quality produce. The demand for floricultural crops, including cut-flowers, pot plants and bedding plants, has also been growing. These trends resulted in expanded use of a wide variety of protected cultivation systems, ranging from plastic film covers to completely controlled greenhouses.

Normally, production takes place on the ground, directly on the soil.[86] Nevertheless, several techniques have been introduced gradually to boost productivity and to compensate production costs associated with protected cultivation which is relatively higher than open-field production. One of these techniques is soilless production (also referred as hydroponics). [87] In this kind of production, there is no connection between plants and soil. This is a technology for growing plants in nutrient solutions (water and fertilizers) with or without the use of an artificial medium for support.[88] The system is categorised as open or closed. In open hydroponic system, surplus and drained nutrient solution is not reused while it is recycled and reused in the case of closed system.

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[84] There are also limitations related to wide scale biological control of plant pathogens in major agricultural crops. These include: environmental robustness, limitation in the availability of biopesticides and specialty supply chain requirements. Because of these reasons, biological control of plant diseases in major agricultural crops exhibited limited success. Leadbeater & Gisi, *supra* note 18, pp. 6-7

[85] M. Raviv and J. H. Lieth, 'Significance of Soilless Culture in Agriculture', in M. Raviv and J. H. Lieth (eds.), (2008), *Soilless Culture:Theory and Practice,* Elsevier, pp. 1-10.

[86] *Ibid.,* p.7

[87] Some use the term "hydroponics" to mean a process of growing plants through water culture without soil and the use of any solid substance (i.e. growing plants in nutrient solutions). Others use the term to refer to systems that do include some sort of substrate to anchor or stabilize the plant and to provide an inert matrix to hold water.

[88] M. H. Jensen, ' Hydroponic Culture for the Tropics: Opportunities and Alternatives', *Extension Bulletins* (1991), No. 329

One of the main reasons for growers to shift away from the use of soil was the proliferation of soil-borne pathogens in intensively cultivated greenhouses.[89] Nematodes and other organisms living in normal soil can affect the growth of plants. In soilless production, soil is replaced by various substrates, such as stone wool, polyurethane, pumice, perlite and tuff. These are virtually free of pests and diseases due to their manufacturing processes. They can also be disinfested between uses to kill any microorganisms.

It is possible in soilless systems to have better control over different factors that can lead to improved plant performance and productivity.[90] Nutrient availability to plant roots can be better manipulated and controlled. The physical and hydraulic characteristics of most substrates allow a simultaneous optimization of both water and oxygen availabilities better than soil. This means plants may not experience deficiencies of these substances that are important for growth unlike experienced by those grown in a soil. These factors have been leading to the worldwide trend of growing plants in soilless media.

Soilless production provides the benefit of environmental protection.[91] The use of this growing system contributes for pollution prevention as this helps to minimize or eliminate the discharge of nutritional ions and pesticide residues to the soil environment.[92] Equally important is the efficiency in water and nutrient use that this production system provides.[93] This is especially true for closed irrigation systems where excess water is drained and reused for plant growth. Systems which re-use all effluents from the root zone are called 'closed systems'. Growers that installed this system, unlike open soil cultivation, can easily assess the amount of water and nutrients supplied for the plant and make corrective measures.[94] By

[89] Raviv and Lieth, *supra* note 85, p. 7
[90] *Ibid*., B. Bar-Yosef, 'Fertigation Management and Crops Response to Solution Recycling in Semi-Closed Greenhouses', in M. Raviv and J. H. Lieth (eds.), (2008) in *Soilless Culture:Theory and Practice,* Elsevier, pp. 341-424; E. Van Os, Closed soilless growing systems: a sustainable solution for Dutch greenhouse, *Water SciTechnol* (1999)*,* Vol. 39, pp. 105–112.
[91] Postma, *supra* note 78, pp. 138-139.
[92] Raviv and Lieth, *supra* note 85, p. 8; Vox, *et al*., *supra* note 61, pp. 1-79.
[93] Bar-Yosef, *supra* note 90
[94] For example, if more than 50% of the water drained, it means that excess amount of water is supplied to the plant. de Varies, *supra* note 12, p. 17

measuring the EC (Electrical Conductivity) value of the drain water, it is possible to know the amount of nutrients plants have been extracting from the fertigation system. The reuse of water lowers the volume of water extraction from freshwater resources and safeguards surface and ground water from pollution. Bar-Yosef points out that under semiarid growth conditions, 50 percent of the water used to irrigate greenhouse crops in open irrigation systems is discharged to the surrounding, but eliminating this discharge can save costs associated with water and fertilizers.[95]

In soilless systems, it is possible to start a production cycle completely free of pathogens.[96] The growing systems can be kept as "clean" as possible by using pathogen free propagation material and substrates and by using sanitation techniques. Soil-borne pathogens that can survive in the deeper soil layers are not problems in soilless culture as the soil is completely replaced by substrates. Nevertheless, recirculation of nutrient solution may create opportunity for plant disease causing organisms to spread through the growing system and may subject the entire crop to significant risk.[97] The pathogens present in the re-circulated irrigation water needs to be disinfested by several techniques including: filtration, heat treatment, oxidation, electromagnetic radiation, active carbon adsorption and copper ionization.[98] Yet combining these strategies into environmentally and economically sound soilless plant production system requires a lot of effort.[99]

Roses (and also other types of cut-flowers) are among the crops that can successfully be grown in soilless culture.[100] Rose production involves the use of the same plant for several months or years (5 to 10 years) with daily harvests.[101] In some countries, the production of roses is shifting rapidly to soilless systems

[95] Bar-Yosef, *supra* note 90, pp. 342-343
[96] Postma, *supra* note 78; J. Postma, *et al*, 'Pathogen Detection and Management Strategies in Soilless Plant Growing Systems' , in M. Raviv and J. H. Lieth, (eds.) (2008), *Soilless Culture: Theory and Practice,* Elsevier, pp. 425-458.
[97] Postma, *supra* note 78
[98] *Ibid*., p. 139.
[99] Postma, *et al*, *supra* note 96, p. 427
[100] E. v. Os, *et al*, Technical Equipment in Soilless Production Systems, in M. Raviv and J. H. Lieth (eds.), (2008) in *Soilless Culture:Theory and Practice,* Elsevier, p. 197; UNEP, *supra* note 76, p. 31
[101] Pizano, *supra* note 19 , p, 31

because of several reasons. One of these is associated with the inherent benefits of the production system which is increased productivity and disease control.[102]

2.2.3. Wastes Management, Recycling and Reuse

It is generally agreed that the best way of waste control is reducing the amount of wastes produced. Farms, for example, can minimize the amount of greenhouse plastic waste generated from floriculture through installing durable or better quality polyethylene. The application of closed hydroponic system contributes to minimize or eliminate the amount of generated wastewater as effluents are reused after treatment. Once produced, different methods, including discharge into surface dumps (landfill), burial in the earth, submersion into the oceans, and incineration are used to eliminate wastes.[103] Nevertheless, all these methods may not be environmentally sustainable.[104] Dumping on landfill, for instance, is not considered as a good waste management practice as this can produce leachate that potentially pollute both surface water and groundwater. The most suitable ecological method of waste disposal is reutilizing or recycling.[105] Also this holds true for greenhouse flowers and vegetables production as methods such as composting and wastewater recycling are widely praised.

Composting

Composting, a process that enables to convert organic wastes into a useful product, is a promising environmentally friendly method.[106] It refers to a biodegradation processes of organic materials carried out by a microbial community under

[102] The existence of high humidity, both in open soil cultivation and in substrate, creates conducive environment for fungi outbreak on the roots and sometimes on the plant itself. Substrates have, by nature, better openings that enable oxygen and water to circulate and control humidity. The rose plant can easily absorb water and nutrients; the remaining water will drain and collected for recirculation.

[103] Adewale M. Taiwo, 'Composting as a Sustainable Waste Management Techniques in Developing Countries', *Journal of Environmental Science and Technology* (2011), Vol. 4, No. 2, pp. 93-102

[104] William Cheuk, *et al*, Benefits of Sustainable Waste Management in the Vegetable Greenhouse Industry, *Journal of Environmental Science and Health*, Part B:Pesticides, Food Contaminants, and Agricultural Wastes (2003), Vol. B38, No. 6, pp. 855–863

[105] *Ibid*.

[106] *Ibid.*

controlled condition.[107] Numerous microorganisms are involved in the composting process and some of these are useful to perform the composting process while others are potentially harmful to human and the environment. The process of composting helps to inactivate the harmful microorganisms.[108] Composters, however, need to provide favourable condition of oxygen, moisture and proper carbon/nitrogen ratio for beneficial microbial growth. Once the composting process starts, aerobic transformation takes place, causing heat production followed by oxygen consumption and water evaporation. The end product of the composting process is compost, a product high in nutrients and rich in humic acids. Compost can be utilized as organic fertilizer or soil additive.

On-site composting and re-use of greenhouse wastes in a form of compost provide a number of benefits.[109] The waste that could otherwise require disposal will be substantially eliminated, thereby reducing environmental impacts and trucking costs. It "complies with the ecological principles of recycling and contributes to the ecosystem viability by reducing wastes size that could disrupt the ecosystem".[110] It can reduce reliance by growers on externally supplied input and can even be a potential source of additional income. Compost application plays the role of fertilizers and provides valuable nutrients to plants.[111]

Treatment wetland systems

Wastewater treatment through constructed wetland is another issue worth consideration in relation to greenhouse effluents. This system "simulates aquatic and habitat conditions of natural marsh ecosystems" called wetland and refers to "the area where the water level is higher than the ground level for most of the year,

[107] F. G. Ceglie and H. M. Abdelrahman, 'Ecological Intensification through Nutrients Recycling and Composting', in Dinesh K. Maheshwari (ed.), (2014), *Organic Farming*, *Composting for Sustainable Agriculture*, Springer, Switzerland, pp. 3-4 ; Blaise P. Bougnom, *et al*., 'Compost: A Tool to Sustainable Urban and Peri-Urban Agriculture in Sub-Saharan Africa?' in Dinesh K. Maheshwari (ed.), (2014), *Composting for Sustainable Agriculture*, Springer, Switzerland, pp. 269-284

[108] Ceglie and Abdelrahman, *supra* note 107, p.8

[109] *Ibid*. William Cheuk, *et al*, Use of Composted Greenhouse Waste as a Growing Medium Component Will Contribute to a Sustainable Waste Management Solution for Vegetable Greenhouses, Biological Agriculture & Horticulture: *An International Journal for Sustainable Production Systems* (2003), Vol. 21. pp. 321-335

[110] Ceglie and Abdelrahman, *supra* note 107, p. 2

[111] *Ibid*.

which results in soil saturation with water, and causes the growth of characteristic plant species".[112] Wetlands have buffering capacity- the ability to improve water quality from inflow to outflow.[113] Biological activities of microorganisms and hydrophytes plants present in natural wetlands, accompanied with sorption of biochemical pollutants, sedimentation and assimilation processes play role in the removal of pollutants from wastewater. Wetland treatment systems are simulated to provide similar functions. They allow the simultaneous removal of biogenic compounds of nitrogen and phosphorus as well as the removal of specific pollutants.

Constructed wetland systems are cost-effective since they are simple self-regulating and self-maintaining that do not require complex technology.[114] Most constructed wetlands are marshes and basins, which are shallow water regions dominated by emergent herbaceous vegetation including cattails, bulrushes, rushes and reeds.[115] These plants play fundamental role in the removal and retention of nutrients thereby preventing eutrophication. [116]

Treatment wetland systems have been used in developed countries for removal of pollutants from point sources and as buffer plant zones for the removal of pollutants from surface runoff.[117] The systems can also be effectively used to treat

[112] Hanna Obarska-Pempkowiak, *et al* (2015), *Treatment Wetlands for Environmental Pollution Control*, Springer, Switzerland, p. 3

[113] H. J. Bavor and M. T. Waters, 'Pollutant Transformation Performance and Model Development in African Wetland Systems: Large Catchment Extrapolation' in Jan Vymazal (ed.), (2008), *Wastewater Treatment, Plant Dynamics and Management in Constructed and Natural Wetlands*, Springer, Switzerland, pp. 319-324

[114] Sim C. Hua (2003), *The use of constructed wetlands for wastewater treatment*, Wetlands International, Malaysia

[115] *Ibid*., pp. 3-6; R.B.E. Shutes, 'Artificial wetlands and water quality improvement', *Environment International* (2001), Vol. 26, Issue 5-6, pp. 441 - 447

[116] There are also subsurface flow wetlands which are composed of soil, sand, rock or artificial media where wastewater flows horizontally or vertically through substrate. Different treatment stages can be involved, but effluents directed to treatment wetlands are pre-treated in septic tanks or retention ponds to remove suspension (e.g. sands and organic solid) and floating (e.g. fats and oils). Obarska-Pempkowiak, *et al*, *supra* note 112, pp. 5-13

[117] Rosemary W. Kimani, *et al*, Treatment of flower farm wastewater effluents using constructed wetlands in lake Naivasha, Kenya, *Indian Journal of Science and Technology* (2012), Vol. 5, No. 1, p. 1870; Shutes, *supra* note 115. Obarska-Pempkowiak, *et al*, *supra* note 112, p.4; Wetlands are normally constructed for one or more of the following purposes: creation of habitat to compensate for natural wetlands converted for agriculture and urban development (1), water quality

agricultural wastewater; however, they are relatively new in Africa despite they are well suited for tropical climates.[118] Recently, wetlands were constructed in Lake Naivasha area, Kenya, to treat wastewater effluents generated from flower commercial farms. A study conducted to evaluate the efficiency of a constructed wetland near the lake concluded that the levels of most physical-chemical constituents, nutrients and heavy metals from wastewater effluents reduced significantly.[119] Wetland treatment systems are found to be highly effective in wastewater effluents control from commercial flower farms operations.

2.2.4. Diversified Water Sources

Water is a vital input in flower cultivation and this unavoidably creates pressure on both surface water and ground water sources. In order to mitigate impacts on these resources, diverse sources of water should be put in use in parallel with measures to minimize water consumption and recycling. In this respect, Shannon describes the experience of floricultural companies in Israel where growers normally obtain water from national water systems and some desalinate sea water.[120] Water is scarce in Israel, thus, diversified water sources are used to enhance economic efficiency and environmental protection. This is through:[121]

- Collecting rainwater from roofs of growing structures and storing in a dam that is lined and covered to prevent evaporation.
- Collecting wastewater from growing structures and mixing with fresh water to give an Ec of 0.5. Ec is the measurement of total dissolved salts in solution. The waste water is treated to remove pathogens from solution.

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improvement (2), flood control (3), and production of food and fiber (4). See Hua, *supra* note 114, p. 2

[118] *Ibid*.

[119] The systems are now widely propagated as solution to the pollution problem that the lake has been facing. Kimani, *et al*, *supra* note 117, pp. 1870-1878

[120] B. Shannon (2009), *Sustainable Production Technologies for the Cut-flower Industry,* Melbourne, International Specialised Skills Institute.

[121] *Ibid*., p. 31

In the Netherlands, Shannon explains that growers do not normally face water availability and quality problems.[122] However, there is a deep rooted practice of westewater recycling and treatment. Water drained from greenhouses are commonly treated with ultravilet light to remove pathogens before resuse while some farms use heat treatment to remove pathogens. Besides, waste runoff is reused in all farms, as required by government legislation.

2.3. Challenges to Adopt Good Agricultural Practices

Though the use of pesticides and fertilizers is promoted as a means to achieve higher agricultural yields, there are concerns about the risks they pose to the environment. Some accentuate the importance of effective control of crop pests without endangering the ecosystem propose through adoption of good agricultural practices.[123] These practices are essential to monitor the level of pesticide residues on any consumable portion of the plant. While the potential risks on human beings and the environment call for improved and good agricultural practices, the challenge remains on how these can be adopted by farmers without compromising productivity. This issue was raised in Kenya with the introduction of the European Union regulations on pesticide application 2000.[124] These regulations require, under certain conditions, that there be no trace of pesticide residue in fruits, vegetables and cut-flowers intended for the European market. Kenyan fresh producers were anxious about the difficulties of shifting to a new type of pesticides in fear of low quality products due to lack of experience and other factors.[125] It was argued that new pesticides may prove less effective, require more frequent application (accordingly entail additional expense), and turn out to be equally toxic to the environment. Yet, it was a necessary requirement for Kenyan horticulture

[122] *Ibid*., p. 44
[123] F. d. Hond, *et al*, 'Questions Around the Persistence of the Pesticide Problem' in Frank Den Hond, *et al*, (eds.) (2003), *Pesticides: Problems, Improvements, Alternatives,* Oxford, Blackwell Publishing, pp. 1-15.
[124] C. B. I. Mussa, *et al*, 'Eastern and Southern Africa: the Experiance of Kenya, Mozambique, the United Republic of Tanzania and Uganda', in V. Jha (ed.), (2005), *Environmental Regulation and Food Safety: Studies of Protection and Protectionism,* International Development Research Centre and Edward Elgar Publishing Limited, pp. 103-144
[125] *Ibid*.

producers and exporters to adapt new measures to maintain their market share built up over the years.

These issues can also be brought into the context of the floriculture industry. On one hand, farmers need to grow flowers that meet the highest quality standard, and this may require the application of excusive pesticides and growth regulators. On the other hand, the practice of growing 'quality' flowers using agro-chemicals may not be in line with what sustainable flower production requires. Instead of chemical pesticides, the use of other alternatives, such as biological pest control, is proposed. In relation to this, issue for further consideration is whether these methods are accessible to growers in developing countries, like Ethiopia, in terms of cost and technological capability. For example, measures to require growers to capture and reuse effluent from production systems are beneficial from environmental protection perspectives. The challenge associated with this requirement is the possible economic pressure on commercial growers.[126] It is a capital-intensive technology that needs "a skilful management of both fertigation and climate management to exploit most of its numerous and undoubted advantages".[127]

Different factors influence growers' willingness to adopt new practices.[128] Some of these include: the degree of environmental regulation, customer- perceived value of the practices in question, grower attitude towards the practice and grower demographic characteristics. In 2008, an informal survey was conducted to investigate opinions about sustainability and its role in the United States floriculture industry.[129] The results of the survey indicate that growers were concerned about the perceptions of consumers towards sustainable floriculture and doubted the benefits they would receive from adopting sustainable practices. However, it is also

[126] Raviv, *et al*, point out: "adoption of a closed recirculation system involves careful study of the economic factors". Unless the true expense of water treatment is known and integrated into final costs, it may be futile to promote the practice. See M. Raviv, *et al*, 'Growing Plants in Soilless Culture: Operational Conclusions' in M. Raviv and J. H. Lieth (eds.), (2008), *Soilless Culture: Theory and Practice,* Elsevier, pp. 545-572.
[127] Vox, *et al*, *Supra* note 61, p. 53
[128] T. J. Hall, *et al*, 'Factors affecting growers' willingness to adopt sustainable floriculture practices', *Hortscience,* (2009), Vol. 44, Issue 5, p. 4346
[129] *Ibid.*

noted that if growers manage to find out that there is positive customer value for sustainable practices, they become willing to adopt the practices. As there is a growing concern among consumers about how the products they buy are produced, they may be willing to pay a premium price for products grown in a sustainable way. Though it may not hold always true, becoming sustainable may enable growers maintain or increase productivity and economic profitability and may contribute to create a niche market. Nevertheless, as Vox, *et al* argue, increased operational costs associated with innovative, complex and sustainable growing systems need to be shared within all stakeholders and end-consumers.[130]

It is also indicated that growers' positive attitude is important factor to greatly improve adoption rates of sustainable practices.[131] However, this alone may not be sufficient to gear growers towards sustainability. The most significant factors affecting the adoption of sustainable practices were simplicity in implementation of the practices followed by the production risk perceived by growers. The effect of environmental regulations and customer value were found insignificant on the adoption of the practices while operation's location and size had significant effects. Contrary to these, Vox, *et al,* acknowledge the significant role environmental laws and binding technical standards play in the introduction of environmental friendly greenhouse systems.[132] However, there should be political commitment and capacity to effectively enforce legislation, which are lacking in most developing countries, including Ethiopia. Vox, et al, also note that the support of government bodies aimed at 'maintaining, improving, encouraging and sponsoring environmental protection, prevention and renewal' is crucial.[133]

Conclusion

The floriculture sector is known to employ a huge number of people throughout developing countries. The issue why countries promote investment in such labour intensive sector is raised again in the next chapter. This chapter, however,

[130] Vox, *et al*, *supra* note 61, p. 69
[131] Hall, *et al*, *supra* note 128, pp. 1346–1351
[132] Vox, *et al*, *supra* note 61, p. 69
[133] *Ibid*.

examined multifaceted impacts of flower cultivation on the environment and human health. Commercial flower production is based on sophisticated greenhouse technology. This production system depends on the use of large amount of water and agro-chemicals, and generates huge quantities of wastes. It is, thus, indicated that greenhouse based production of flowers can be 'environmentally unfriendly'- explained in terms of pollution and overexploitation of surface and groundwater, soil degradation, and loss of aquatic life. The chapter demonstrates how every stage in flower production contributes for environmental degradation and how existing situations in developing countries aggravate the problems.

This chapter explored into the concept of sustainable flower production in the context that direct investment in the floriculture sector is important for the development and economic growth of countries like Ethiopia. It demonstrates possible ways through which environmental degradation can be reduced while at the same time productivity maintained. The chapter demonstrates that introducing innovative technologies and strategies can increase production costs and can be less accessible for growers in developing countries.

The chapter has identified major factors influencing growers to introduce environment friendly production methods and underscores the significant role that environmental laws and binding technical standards can play in the introduction of environmental friendly greenhouse systems. Yet these hinge on institutional capacity and political will to establish effective system of law implementation. The next chapter focuses on discussing the factors that obstruct developing countries from strictly regulating environmental impacts, and the required system of governance in environmental regulation.

Chapter Three: Environmental Regulation of Direct Investment: Theories and Principles

Introduction

The previous chapter explored the multifaceted linkages between flower cultivation and the environment. It demonstrated how every stage in flower cultivation can possibly leave environmental footprints calling for urgent need for regulation. This chapter presents theoretical premises and practical challenges behind the effort to regulate environmental impacts of direct investment, like in the floriculture sector, in developing and least developed countries. The urgent need to alleviate poverty in these countries requires mobilization of resources towards achieving this goal. However, limitation in the availability of financial and other resources highly affects development and economic growth. Countries encourage inflow of capital with the view that it is one of the means to triumph over financial limitations, foreign exchange, and skill – all are important inputs for development. Induced by these and other benefits that investment is believed to bring for domestic development, countries put its promotion at the centre of their development strategies.

Ethiopia, categorized amongst the least developed countries in the world, has a vulnerable economy, dependent on foreign aid as well as international loans.[1] Its poverty, with droughts and famines regular occurrences, is a major challenge. Accordingly, enhancing flows of investments has been taken as major alternative source to inject foreign capital to the economy. The government has put in place different strategies to encourage investment in both manufacturing and agriculture sectors. The floriculture sector is exemplary in terms of achieved successes following consecutive policy measures coupled with other contributory factors.

Yet countries may not benefit from direct investment as anticipated in their development strategies due to a number of factors. The scepticism about the role FDI plays for host state's development relates to the existence of differences in the

[1] See Chapter One, Section 1.2

interests of foreign investors and host governments.[2] While foreign companies' interest involves profit maximization, competitiveness and access to international markets, host governments are concerned about economic development. In countries where effective polices to create common ground for the two interests are lacking, FDI may not bring positive contributions for development. Apart from this, unequal negotiating power between least developed counties and investing companies; lack of institutional capacity to negotiate mutually beneficial investment arrangements; and weak political commitment diminishes the contributory role of FDI for domestic development.[3] Host countries' ambition to achieve development may lead them to accept and become submissive to the conditions set by foreign companies. These and other factors that hinder developing and least-developed countries from reaping the fruits of direct investment are briefly outlined in the present chapter. It is pointed out that a country's ambition to become competitive in attracting investment is a major factor for weak environmental regulation.

The chapter addresses the issues of how to reconcile economic growth with environmental protection in direct investment and how to reap such benefits as employment and foreign currency earning without affecting host state's environment. It is argued that states hosting direct investment need to introduce effective policy and legal measures with a view to minimize negative effects on the environment and to maximize positive contributions to development. In view of this, the chapter discusses policies and principles propagated by ecological modernization theory that inform legal measures directed towards minimizing environmental impacts associated with economic activities. It particularly illustrates a system of multilevel environmental governance that involves the government, companies and civil society. Theoretical and practical insights discussed in the chapter lay foundations for discussions and critical analysis in the upcoming chapters.

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[2] J. R. Kehl (2009), *Foreign Investment and Domestic Development: Multinationals and the State,* Lynne Rienner Publishers; Kyla Tienhaara (2009), *The Expropriation of Environmental Governance: Protecting Foreign Investors at the Expense of Public Policy*, Cambridge University Press, Cambridge

[3] L. Zarsky (2005), *International Investment for Sustainable Development: Balancing Rights and Rewards.* Earthscan, London, p. 28

3.1. Investment, Development and Poverty Reduction

Most developing and least developed countries promote investment to reduce poverty and achieve development. Through this, countries strive to acquire new and better technologies, skill, and employment opportunities.[4] The know-how and skill provided by direct investment can be transferred to domestic firms and, through this, investment can improve host country's stock of knowledge. Inflow of investment may increase the demand for labour and thereby creates means of subsistence for many people. Foreign direct investment has prospects for countries to integrate into the international trading system; increases access to international markets; contributes for national revenue generation and infrastructure development; and helps to create a more competitive business environment.[5] It may raise efficiency and expand output. The cumulative effect of all these could be economic growth and development of the host state. Investment by foreign companies may also improve host states' environmental and social conditions through, for example, transferring cleaner technology and encouraging domestic firms to adopt better environmental management practices. Inspired by these and other advantages, developing and least developed countries open their doors for both domestic and foreign investors by improving entry conditions and reducing restrictions; they liberalize investment regime; and lay down policies to attract as much investment as possible into their jurisdictions.[6]

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[4] T. H. Moran (1998), *Foreign Direct Investment and Development: The New Policy Agenda for Developing Countries and Economies in Transition,* Institute for International Economics, Washington, D.C; K. P. Gallagher and L. Zarsky, "No Miracle Drug: Foreign Direct Investment and Sustainable Development" in L. Zarsky (2005) (ed.), *International Investment for Sustainable Development: Balancing Rights and Rewards,* Earthscan, London

[5] OECD (2000), *Foreign Direct Investment, Development and Corporate Responsibility*, OECD Proceeding, OECD, Paris; I. A. Moosa (2002), *Foreign Direct Investment: Theory, Evidence and Practice*, Palgrave, New York, pp. 68-95; J. Jones and C. Wren (2006), *Foreign Direct Investment and the Regional Economy*, Ashgate Publishing, Hampshire, pp. 72-76

[6] For example, among investment policy measures taken in 2014, more than 80 per cent are aimed to improve entry conditions and reduce restrictions. They are mainly centred on investment facilitation and sector-specific liberalization. See UNCTAD (2015), *World Investment Report 2015*: Promoting International Investment Governance, UNCTAD, New York and Geneva, p. xi; See also UNDP (2003), *World Investment Report, FDI Policies for Development: National and International Perspectives*, UNDP, Geneva, pp. 86-91; N. Mabey and R. McNally (1999), *Foreign Direct Investment and the Environment: From Pollution Havens to Sustainable Development,* A WWF-UK Report, p. 11

Countries introduce policies and strategies aimed at promoting inflow of investment and maximizing the benefits that it provides for development. Some of these are targeted towards bringing macroeconomic stability, infrastructure improvement, and transparency within the political and regulatory environment. Some countries pursue policies that liberalize the FDI regime, exempt investors from paying tax for specified period; and allow profits repatriation.[7] For instance, in 2010, about 149 policy measures affecting foreign investment were adopted by 74 countries. Among these measures, 101 relate to investment liberalization and promotion.[8] Apart from these, countries conclude bilateral investment agreements (BITs), which normally extend rights and protections to foreign investors, with major capital exporting countries. Though it remains controversial whether weak labour and environmental standards affect the decisions of companies to invest in a particular jurisdiction, many developing countries show reluctance to protect labour rights and the environment with the assumption that there is negative relationship between stringent labour and environmental standards and a country's competitiveness in attracting FDIs.

At the international level, the surge in FDI has been increasing with some fluctuation. The global FDI flows, which were $ 207 billion in 1990, picked to $ 1.971 trillion in 2007.[9] In 2008 and 2009 the flows were affected by the economic and financial crises that curtailed multinational companies' access to financial resources and market opportunity. However, the economy started to recover and, in 2010, global flow of FDI rose to $1.24 trillion and attained $1.47 trillion in 2013.[10] According to the 2015 World Investment Report, however, global FDI flows declined in 2014, falling by 26 % to $1.23 trillion, due to 'the fragility of the global economy, policy uncertainty for investors and elevated geopolitical risks'.[11] Despite this, inward FDI flows to developing economies, which were $574 billion in 2010,

[7] Kehal, *supra* note 2
[8] UNCTAD (2011), *World Investment Report 2011: Non-Equity Modes of International Production and Development*, United Nations, Geneva, pp. 24-25
[9] *Ibid*., p. 24
[10] *Ibid*., pp. 1-2; UNCTAD, *supra* note 6, p. 2
[11] UNCTAD, *supra* note 6

increased by 2 % in 2014, reaching their highest level at $681 billion.[12] Likewise FDI flows to least developed countries increased by 4 % in the same year. [13] UNCTAD forecasts that there will be an upturn in global FDI flows to $1.4 trillion in 2015, $1.5 trillion in 2016 and $1.7 trillion in 2017.[14]

Norman and Stiglitz note that, in Sub-Saharan African region, despite measures taken to adopt 'sound policies', there is weak flow of investments into manufacturing or service sectors that would give rise to sustained growth and job creation.[15] The majority of counties in the region managed to attract some investments in natural resources that "may simply reflect the fact that those countries willing to give away their resources for a low enough price can always find some company to take them".[16] In 2014, FDI inflows to Africa remained stable at $54 billion.[17] Among the Sub-Saharan regions, while flows to West Africa were affected by Ebola, regional conflicts and falling commodity prices and declined by 10 %, Central Africa and East Africa (where Ethiopia is located) saw their FDI flows increased by 33 % and 11 %, respectively. In the same year, estimated FDI flows to Ethiopia reached $1.2 million (increased by 26 %).[18]

[12] There was weak FDI flow to least developed countries, Africa, landlocked developing counties and small island developing countries, while its flow to East and South-East Asia and Latin America is strong. See UNCTAD, *supra* note 8, pp. 40-87. Among the top 10 FDI recipient countries in the world, 5 are developing economies. See UNCTAD, *supra* note 6

[13] UNCTAD, *supra* note 6

[14] *Ibid*., p.2

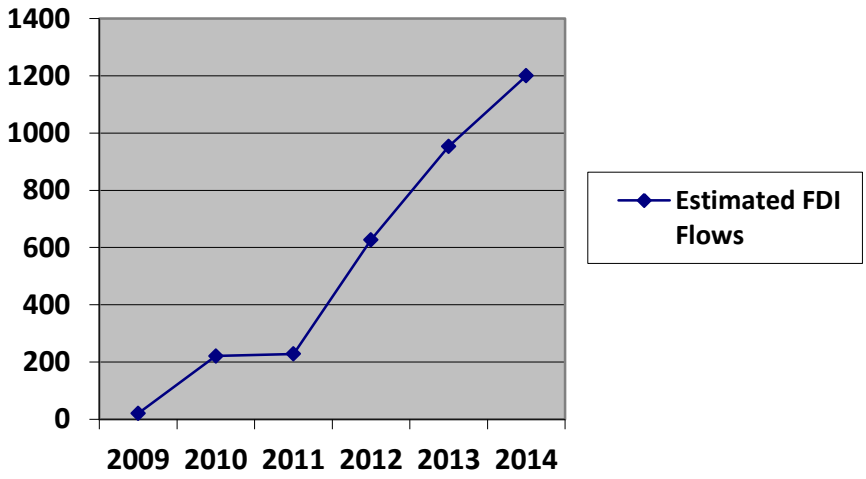
[15] A. Norman and J. Stiglitz, "Strategies for African Development" in A. Noman, *et al* (2011) (eds.), Good Growth and Governance in Africa: Rethinking Development Strategies, Oxford Scholarship Online, pp. 3-50

[16] *Ibid*., p. 6. Norman and Stiglitz are curious that these investments may only bring few jobs and, in the majority of cases, harm the environment and deplete natural resources.

[17] UNCTAD, *supra* note 6 .

[18] *Ibid*.

Figure 1: Estimated FDI flow to Ethiopia from 2009 to 2014



Source: World Investment Report 2015 [19]

The flows of investment to Ethiopia exhibited a sharp growth especially since 2011. The country continued to attract investment to both the manufacturing and agriculture sectors as a result of consecutive policy measures taken by the government. Section 1.3 of this research discussed those investment incentives made available for investors.

Relaying on foreign investment as a means to foster domestic development, nevertheless, triggers concerns.[20] The outcomes of FDI for domestic development could be positive depending on a number of factors, and, in some cases, the risks associated with FDI may outweigh the benefits acquired from it.[21] First, FDI may impinge host state's balance of payments through increasing imports. Furthermore, modes of incentives granted to foreign investors by Host states, like tax allowances and exemption, and transfer-pricing practices reduce government revenues and

[19] *Ibid.*

[20] Moran suggests that "there is a common assumption that if international companies conduct their activities with the same good citizenship standards abroad that they do at home, their contribution to the host economy can only be positive. But this reasoning hinges, implicitly, on the presence of highly competitive conditions that are fundamentally at odds with both theory and evidence about FDI behavior. ...the possibility that FDI might lead to fundamental economic distortion and pervasive damage to the development prospects of the country is ever present". Moran, *supra* note 4, p. 2

[21] S. Kahai, "The Role of Foreign Direct Investment and Its Determinants", in H. Kehal (2004)(ed.), *Foreign Investment in Developing Countries,* Palgrave Macmillan, New York; Moosa, *supra* note 5, pp. 68-98

affect balance of payments. Second, FDI can have potential negative impact on domestic investments and industrial growth. FDI liberalization may make domestic firms less competitive and lead them to impoverishment. In other words, it may cause the crowding out of domestic investment where local firms do not have the capability to compete with foreign companies. Local firms may lack competitive capacity with foreign companies, which are better equipped with finance and skilled personnel.[22] Third, it may limit domestic control over resources. Fourth, the social and environmental costs of FDI can be high. It may lead to widespread environmental degradation and exploitation of low-paid workers.[23] Irrespective of all these concerns, FDI continued to have prominent place in the development strategies of many countries.[24]

3.2. Factors Contributing to Investment Flows

The decisions firms make about place of investment are among the factors influencing investment policies that countries pursue. Firms take into account the advantages that host states offer in order to decide place of investment. The availability of large markets; prospects for market growth; and per capita incomes of host states are among determinant factors in a company's decision about location.[25] These factors provide better opportunities for enterprises to exploit their ownership advantages and create possibilities for economies of scale.[26] A country with abundant natural resource and low labour cost is advantageous in catching the attention of foreign investors. Companies, apart from low cost, will take into account the productivity and availability of both natural and human resources. The levels of infrastructure development, including quality highways,

[22] This will increase entry costs or affect the competitiveness of domestic companies. The crowding out of domestic investment may affect the host county's economy in the long run.

[23] Mabey and McNally, *supra* note 6; OECD (2008), *The Impact of Foreign Direct Investment on Wages and Working Conditions*, OECD-ILO Conference on Corporate Social Responsibility, OECD Conference Centre, Paris

[24] N. Kumar and J. P. Prandhan, "Foreign Direct Investment, Externalities and Economic Growth in Developing Countries: Some Empirical Explorations" in E. M Graham (2005), *Multinationals and Foreign Investment in Economic Development*, Palgrave Macmillan, New York, pp. 42-52, H. Kehal, *Foreign Investment in Developing Countries,* Parlgave MacMillan, New York, 2004, pp. 11-18

[25] UNCTAD (1998), *World Investment Report 1998: Trends and Determinants,* United Nations*,* New York and Geneva; OECD (2002), *Foreign Direct Investment for Development: Maximising Benefits, Minimising Costs,* OECD Publications, Paris, pp. 37-40

[26] OECD, *supra* note 25, p. 38

railways, seaports and airports as well as telecommunication services, are the other determinant factors in location decisions.[27] Furthermore, home states' FDI policy; the transparency and effectiveness of the legal framework; political stability; and availability of reliable investment protection are significant factors in attracting FDI.[28]

Investment projects are normally subjected to risk assessment processes and a country's risk measure can influence a company's investment decision.[29] Various forms of risk can impact the expected performance of investments. Some of this can arise from the external environment while others are endogenous factors-specific to the operational and functional structure of the investment objective. Cross-border investments particularly carry additional risks which include those arising from national differences in economic structures, policies, socio-political institutions, geography and currency.[30] Government stability, internal and external conflict, religious and ethnic tension, and corruption are components of political risk and have close association with FDI flows. Since potential threats can affect project profitability, companies undertake risk analysis before they decide to invest in a territory of another state. This involves a "realistic economic and financial evaluation of the project, revealing those risk factors that influence the formulation of decision making criteria"[31] It is a process of mapping all the economic, social and

[27] 'FDI is most likely to flow to those areas with good accessibility and lower transportation costs'. *Ibid*.

[28] UNCTAD, *supra* note 25; World Bank, *Global Economic Prospects and the Developing Countries 2003,* World Bank, Washington, DC, 2003, p. 66. It does not, however, mean that all these factors can equally influence location decisions irrespective of the nature of the investment. For instance, resource-seeking firms particularly take into account the availability of skilled and inexpensive labour. UNDP, *supra* note 6, p. 85

[29] See Camelia Burja and Vasile Burja, The Risk Analysis for Investments Projects Decision, *Annales Universitatis Apulensis Series Oeconomica* (2009), Vol. 11, No. 1. Bojana Vuković and Kristina Mijić, *Risk Management in the Investment Process*, International Symposium Engineering Management And Competitiveness 2011 (EMC2011) June 24-25, 2011, Zrenjanin, Serbia, pp. 245-246; K. Hayakawa, F. Kimora and H. Lee (2011), *How Does Country Risk Matter for Foreign Direct Investment*, IDE Discussion Paper No. 281

[30] Analysts categorise country risk into six main groups: economic, transfer, exchange rate, location, sovereign and political risks. Duncan H. Meldrum," Country Risk and Foreign Direct Investment"*, Business Economics*(2000), Vol. 35, Vol. 1, pp. 33-40. Examples of risk include: changes in economic policy goals (fiscal, monetary or wealth distribution); a decision by foreign government to restrict capital movement; restriction on profit and dividend repatriation; or unexpected change in currency regime.

[31] Vuković and Mijić, *supra* note 29, pp. 245-246

political factors that increase risks in expected return on investment. Higher risks associated with country risks of host countries are discouraging factor for foreign investment by multinationals.

Countries are advised to make appropriate decisions about the nature of policy measures they should introduce in order to yield the required benefits from investment.[32] According to the OECD report:

> national policies and international investment architecture matter for attracting FDI to a larger number of developing countries and for reaping the full benefits of FDI for development... host countries... need to establish a transparent, broad and effective enabling policy environment for investment and to build the human and institutional capacities to implement them.[33]

Good governance plays a pivotal role in countries' endeavour to attract and promote more investment in their jurisdiction. Components of good governance such as transparency, credibility, accountability and public participation are important tools to encourage investment. Host states need to work against barriers that affect entrepreneurship, competition and trade. They should eliminate restrictions on foreign investment, and administrative barriers to entry and exit. In addition to these, policies aimed at fighting corruption play key role to attract investment.[34] Some researchers argue that institutional environments with strong political, social and legal institutions "reduce transactions costs, protect

[32] Zarsky, *supra* note 3, p. 26; See also T. H. Moran (2006), *Harnessing Foreign Direct Investment for Development: Policies for Developed and Developing Countries*, Center for Global Development, Washington, D.C.

[33] OECD, *supra* note 25, p. 7; "Good policy" and "Good institution" are generally advocated by international economic institutions (the World Bank and the IMF)as necessary conditions to enhance economic performances of states. Economic development failures in Africa are usually associated with the difficulties to put in place these two conditions. However, what constitutes good policy and institution is open for discussion and exactly replicating policies and institutions that may have worked in one context may not work for another. Norman and Stiglitz, *supra* note 15.

[34] Corruption is one of the factors that deter flow of foreign investment "by increasing transaction costs and by raising uncertainty regarding the enforcement of contracts, the predictability of operation costs, and the likelihood of obtaining needed licenses and permits". World Bank, *supra* note 28, p. 79

property rights and lessen the uncertainty of doing business on foreign soil".[35] Consequently, the presence of such institutions will be positively associated with the ability to attract FDI.

3.3. The Nexus between Investment and Environment

The growth of FDI engenders considerable debate among policymakers and activists concerning the implications of this trend for the environment. The main anxiety relates to the issue of how a particular investment will affect a host country's environment.[36] Investment often involves activities with potential environmental impacts, which include resource extraction, infrastructure or manufacturing operations. In countries without effective environmental regulatory frameworks, investment may cause devastating environmental problems such as loss of biodiversity, resource depletion, pollution, and ecological degradation as a whole. Apart from this, investment may jeopardize indigenous rights and community health.

The second issue relates to the impact of competition among countries to attract investment on environmental protection. As Martinez and Allard explain:

> Host governments have always been concerned about how to strategically position themselves in an increasingly competitive market for a limited supply of investment resources. Competition is fierce, as many countries offer similar attractions to investing firms, e.g., tax breaks, profit repatriation, low domestic content requirements, etc.[37]

With a view of remaining competitive in attracting investment, thus, states become reluctant to set stringent environmental standards or even if they set better

[35] Candace A. Martinez and Gayle Allard, Foreign Direct Investment and Social Policy, FDI and Social Policy, *The Journal of Business in Developing Nations* (2008-09), Vol. 11, p. 82

[36] K. R. Gray, Foreign Direct Investment and Environmental Impacts- Is the Debate Over?, *RECIEL* (2002), Vol. 11, No. 3; B. Gentry, "Foreign Direct Investment and the Environment: Boon or Bane?", in OECD (1999), *Foreign Direct Investment and the Environment , OECD Proceedings,* OECD, Paris; L. Zarsky, Havens, Halos and Spaghetti: Untangling the Evidence about Foreign Direct Investment and the Environment, in OECD (1999), *Foreign Direct Investment and the Environment,* OECD, Paris

[37] Martinez and Allard, *supra* note 35, p. 79

standards, they may be detracted from enforcing them.[38] In other words, as countries strive to become competitive in attracting investment, they may refrain from effectively regulating direct investments. A country's ambition for investment could lead them to undervalue their environment and engage in 'race to bottom'. There is a perceived attitude that environmental regulations impede economic growth.[39] The traditional assumption holds that jurisdictions with stringent environmental standards are disadvantageous to compete with those whose standards are less stringent. The assumption bases itself partly on the conviction that compliance with environmental regulations will normally add production costs on companies and affects their overall income.[40] To minimize these costs and remain competitive in the market, the argument is that companies may prefer to invest in or relocate to states with less stringent environmental standards.[41] Based on this premise, states show relentless efforts to reduce costs of doing business. One of the actions they take in this regard is reducing effectiveness and regulatory stringencies.[42] As will become apparent later in the thesis, in the Ethiopian regulatory systems, there is a great reluctance to enforce environmental standards. As we shall see there are many reasons for such ineffective enforcement.

In response to differences in regulatory stringency, firms may relocate or expand to jurisdictions with lax environmental regulation, leading those jurisdictions to become 'pollution havens' to 'dirty' industries. Resource and pollution intensive industries or companies that are required to comply with regulations, which demand strict pollution control requirements, may locate to places where

[38] C. Oman (2000), *Policy Competition for Foreign Direct Investment: A Study of Competition for Foreign Direct Investment*, OECD, Paris, pp. 91-94; R. Prizzia, The Impact of Development and Privatization on Environmental Protection: An International Perspective, *Environment, Development and Sustainability* (2002), Vol. 4

[39] R. C. Feiock and C. Stream, Environmental Protection Versus Economic Development: A False Trade-Off? *Public Administration Review* (2001), Vol. 61, No. 3, pp.313-314

[40] Environmental regulation may impose duties which can potentially increase cost on industrial firms such as "absorbing some or all of the costs of installing pollution abatement equipment, disposing of hazardous waste, and cleaning up after industrial accidents". E. Williams, K. Macdonald and V. Kind, Unravelling the Competitiveness Debate, *European Environment* (2002), Vol. 12, p 284; See Feiock and Stream, *supra* note 33, pp. 314-315

[41] Gray, *supra* note 36, pp. 307-308

[42] *Ibid*.; N. D. Woods, Interstate Competition and Environmental Regulation: A Test of the Race-to-the-Bottom Thesis, *Social Science Quarterly* (2006), Vol. 87, No. 1, pp. 175-176

compliance costs are lower.[43] These companies may take environmental costs, such as pollution abatement costs, into account when they make decisions about place of investment. As majority of least developed counties are desperate to assure the continuous flow of investment, the possibility of setting or implementing strong environmental standards will be constrained.

On the contrary, some argue that the cost that companies incur to comply with regulations is not as such significant when compared with a company's overall production costs.[44] Companies will not move to other jurisdictions based on the ground of regulatory variations alone. Strengthening this view, others note that environmental regulation does not occupy a major place in investment decisions of companies.[45] The decision to invest in a certain state is more influenced by taxation, domestic market conditions and foreign exchange restrictions.[46] As a result, setting stringent environmental and other regulations will not jeopardize a country's interest to attract investment.[47] Despite all these arguments, this research indicates that the anxiety strict environmental regulation affects competitiveness in attracting investment and the attitude that regularly procedures discourage investment flows are leading regulatory authorities in Ethiopia to shy away from enforcing regulations. This is especially true in relation to pesticide registration and water resources protection.[48]

On the positive side, investment may bring opportunities for environmental protection. Depending on different circumstances, the contributions of investment

[43] Mabey and McNally, *supra* note 6

[44] Woods, *supra* note 42, p. 176; S. B. Brunnermeier and A. Levinson, Examining the Evidence on Environmental Regulations and Industry Location, *Journal of Environment & Development* (2004), Vol. 13, No. 1, p.7

[45] In relation to this Zarsky suggests that "the effects of environmental regulation might be small or irrelevant compared to other determinants of industry location, such as transport costs and wage rates; and other determinants of environmental performance, including governmental regulation, income and community pressure, might matter much more than foreign ownership or links to OECD markets". Zarsky, *supra* note 36, p. 54

[46] Gray, *supra* note 36, p. 308; Gentry, *supra* note 36, p. 32

[47] Some even go to the extent of arguing that countries with stringent regulation can better attract investment to their jurisdiction. Firms that produce environmentally sound products, process technology and/ or adopt progressive environmental strategies may prefer to invest in countries with stringent environmental standards to enhance their overall efficiency. See Williams *et al*, *supra* note 40, p. 287

[48] See Chapter Five and Chapter Six of this research.

for environmental protection can be positive. Companies may promote basic environmental goals through creating awareness about environmental factors; bringing efficiency in resource use; and addressing existing environmental problems. As Araya notes: "the prospects of clean technology diffusion, by way of direct transfer and pullovers, is a key motivation for host-nations- especially in developing countries- to attract FDI".[49] FDI may "help to drive up standards in developing countries by transferring both cleaner technology and/or better environmental management practices".[50] This, however, depends on the firm's technology choice. The presence of foreign firms in host states may improve environmental protection standards if the firms employ better techniques that reduce pollution and minimize resource depilation or implement effective environmental management system.[51] Also spill over depends partly on local firms' keenness to adopt or imitate clean technologies, and the availability of skilled labour.[52]

3.4. The Environment-development balance in direct Investment

The issue of how a country should deal with the goals of environmental protection and economic development attracts the attention of scholars. Some argue that a country should give priority to economic development over environmental protection.[53] Since a state's ability to solve environmental problems increases as it

[49] Monica Araya, "FDI and the Environment: What Empirical Evidence Does and Does Not Tell Us?", in L. Zarsky (2005), *International Investment for Sustainable Development: Balancing Rights and Rewards,* Earthscan, London, p. 54

[50] Zarsky, *supra* note 3, p. 27

[51] Araya, *supra* note 49, p. 59. Multinational corporations sometimes facilitate spill over through requiring their local suppliers to apply better and environmental friendly technologies and management practices Apart from this, foreign direct investors my instigate host governments to implement environmental regulation in predictable, transparent and consistent manner, including against local firms. Nevertheless, there is no consensus among researchers about the existence of positive link between foreign firms and environmental performance in host states. See Gentry, *supra* note 36, p. 36.

[52] Zarsky notes that '... government regulation, the rate of economic growth, company culture, the particular industry in which the FDI takes place and the rules that govern FDI- are key variables'. Zarsky, *supra* note 3, p. 31.

[53] T. Panayotou (1993), *Empirical Tests and Policy Analysis of Environmental Degradation at Different Stages of Economic Development*, Working Paper WP238 Technology and Employment Program, International Labour Office, Geneva; G. Grossman and A. Kreuger (1993), *Environmental Impacts of a North American Free Trade Agreement, The U.S. Mexico Free Trade Agreement*; for

reaches a certain level of development, resources should be channelled first into achieving economic development. Therefore, initially focus must be on designing policies aimed at bringing maximum utilization of resources and economic prosperity. According to this view, ecological preservation presupposes growth, and it is only when a country achieves a certain level of economic development that it can protect the environment. However, pursuing a policy that prioritizes economic development over environmental protection is not in line with what sustainable development demands.[54] The pursuit of this principle requires a country's aspiration to achieve economic development to be reconciled with environmental protection interests. It bases itself on possibility of achieving the two goals simultaneously. The questions that need to be addressed in relation to this include how a country can reconcile and achieve both interests; what form of governance should a country have to protect the environment from development related impacts; and what types of policies a country should adopt to enhance development without compromising its interest to protect the environment.

On one hand, the urgent need to alleviate poverty in developing and least developed countries and, on the other hand, the acute shortage of resources, coupled with a country's capacity to regulate investment, puts the environment at risk. States may fail to pay equal attention to environmental concerns with

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arguments on the nexus between economic development and environmental protection see also T. Panayotou (2003), *Economic Growth and the Environment*, Harvard University and Cyprus International Institute of Management, Paper prepared for and presented at the Spring Seminar of the United Nations Economic Commission for Europe, Geneva, March 3, 2003, http://www.unece.org/fileadmin/DAM/ead/sem/sem2003/papers/panayotou.pdf, last accessed 13 September 2013

[54] Sustainable development is defined as 'development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs', See *Report of the World Commission on Environment and Development: Our Common Future*, U.N.GA Res., A/42/427, 1987; For further descussion on the concept see M. Redclift (2005), Sustainable development (1987–2005): an oxymoron comes of age, Sustainable Development (2005), Vol. 13, Issue 4, pp. 212–227; B. Hopwood, M. Mellor and G. O'Brien, Sustainable development: mapping different approaches, *Sustainable Development* (2005), Vol. 13, Issue 1, pp. 38–52; J. Harlow, A. Golub and B. Allenby, A Review of Utopian Themes in Sustainable Development Discourse. *Sustainable Development (2013*), Vol. 21, Issue 4, pp. 270–280; A., Dobson, Environmental citizenship: towards sustainable development, *Sustainable Development* (2007), Vol. 15, Issue 5, pp. 276–285; and A. Dobson (1999), *Fairness and Futurity: Essays on Environmental Sustainability and Social Justice*, Oxford University Press, Oxford

economic development.[55] Environmental and human health consequences related to flower production, discussed in Chapter Two, are exemplary in terms of showing multifaceted impacts of investment on the environment. The repercussion on the environment will be intense and irreversible if a state fails to regulate environmental impacts of investment for the sake of guaranteeing the continuous flow of investment. As there are limits to natural resources, economic growth and development, even if achieved, will not sustain over time. Since every human activity, in one way or another, depends on the environment, the quest for human development requires the environment to be preserved.

There has been considerable debate about the possibility of reconciling the goals of economic development and environmental protection.[56] Some environmentalists propagated deindustrialization as a solution to become less dependent on industries and minimize ecological impacts. On the other hand, with the assumption that there is always 'zero sum' between the two interests, expenses incurred to preserve the environment were seen to have impact on economic competitiveness and growth. It was with the emergence of the principle of sustainable development that many started to believe in the possibility of achieving the two goals simultaneously. The basic tenet beneath the principle is "to improve and sustain human wellbeing indefinitely without impairing the life support systems on which it depends".[57] Following the birth of the principle, scholars came up with valuable ideas and theories on how to minimize and avert the impact of development on the environment. The research, in this chapter, highlights on some valuable insights important to explore a form of environmental governance with different actors by applying ecological modernization theory.

3.4.1. Ecological Modernisation Theory

The theory of ecological modernisation mainly focuses on environmental reform processes such as restructuring of processes of production and consumption.

[55] J. C. Dernbach, Achieving Sustainable Development: the Centrality and Multiple Facets of Integrated Decision making, *Indiana Journal of Global Legal Studies* (2003), Vol. 10, Issue 1, p. 252
[56] D. J. Fiorino (2006), *The New Environmental Regulation*, The MIT Press, Cambridge, pp.15-16
[57] B. H. Farrell and L. Twining-Ward, "Reconceptualising Tourism", *Annals of Tourism Research* (2004), Vol. 31, No. 2, p. 275

Policies that encourage the adoption of techniques and principles are taken as important requirements of transition towards sustainable production.[58] Some of these techniques and principles include: integrated pollution control; the precautionary principle[59]; cost-benefit analysis[60], risk analysis, and 'ecological rationality' [61].

In ecological modernization theory, the perspectives that counter industrialization and capitalism are challenged. Instead, 'green capitalism' is encouraged.[62] The deep-rooted understanding holds the possibility to achieve environmentally sound production and consumption through the introduction of environmental reform policy measures.[63] The theory is optimistic about the possibility of bringing behavioural changes within the capitalist socio-economic system towards sustainable production and consumption.

Ecological modernization theory purports that economic growth and environmental protection goals can be achieved simultaneously.[64] The key idea is that it is possible to achieve ecologically sustainable economic development through means of

[58] D. Pepper, Ecological modernisation or the 'ideal model' of sustainable development? Questions prompted at Europe's periphery, *Environmental Politics* (1999), Vol. 8, No. 4, p. 3 ; P. Christoff, Ecological modernisation, Ecological modernities, in P.H.G. Stephens, J. Barry and A. Dobson (2006), *Contemporary Environmental Politics from Margins to Mainstream,* Routledge, pp. 184-185

[59] The precautionary principle demands governments to take appropriate actions with the view to minimize or avert potential harm to the environment before they actualize. This enables governments and companies to anticipate environmental risks before they materialize. P. Harremoes, *et al*. (2002), *The Precautionary Principle in the 20th Century: Late Lessons From Early Warnings*, Earthscan Publications, London, p. 4

[60] This refers to "the economic appraisal of policies and projects that have the deliberate aim of improving the provision of environmental services or actions that might affect [] the environment as an indirect consequence". See Giles Atkinson and Susana Mourato, Environmental Cost-Benefit Analysis, *Annual Review of Environment and Resources* (2008), Vol. 33, No. 3, p. 318

[61] This approach may not necessarily imply reduction of consumption, but it deals with "what consumption is environmentally sustainable and how can we turn unsustainable consumption practices into environmentally more sound ones". A. Mol and G. Spaargaren, Ecological Modernization and Consumption: A Reply, *Society & Natural Resources*, (2004), Vol. 17, No. 3, p. 264

[62] The overarching assumption is not neither to consider capitalism and industrialization as essential preconditions for environmentally sound production and consumption nor to propagate their abandonment. See A. Mol and G. Spaargaren, Ecological modernisation theory in debate: A review, *Environmental Politics* (2000), Vol. 9, No. 1, p. 22

[63] Mol and Spaargaren note that ecological modernization theorists 'focus on redirecting and transforming 'free market capitalism' in such a way that it less and less obstructs, and increasingly contributes to, the preservation of society's sustenance base in a fundamental/structural way'. *Ibid*., p. 23

[64] J. Connelly and G. Smith (2003), *Politics and the Environment: From theory to practice, Second edition,* Routledge, New York, p. 5 ; See also Mol and Spaargaren, *supra* note 54, p. 22

environmental technologies; transformation of modern institutions; and bringing changes in values and practices.[65] These and other strategies enable to reconcile economic growth with the requirements of ecological sustainability. Improved environmental technologies may help to minimize resource inefficiency. The important roles innovators, entrepreneurs and other economic agents play in environmental reform processes are recognized.[66] Although the role of the state remains central in environmental reforms and managements, actors, other than the state, including the business sector and environmental NGOs, play fundamental role to bring behavioural changes. In relation to the role states should play in environmental reform and management, Mol states that "... the role of the state in environmental policy is changing, or will have to change, from curative and reactive to preventive, from 'closed' policy making to participative policy making, from centralized to decentralized, and from dirigistic to contextually 'steering' ".[67]

The theory is in favour of more decentralized, flexible and consensual styles of national environmental governance rather than top-down hierarchical 'command and control' regulation.[68] It places great emphases on the role different actors have in integrating environmental considerations within economic and social decision-making processes.[69] This gives opportunity for non-state actors to engage in environmental protection initiatives through, for example, the adoption of voluntary environmental protection standards. This relatively new form of environmental governance and regulation creates partnership between state and private enterprises, state and citizens, and citizen and business towards sustainable economy and environment.[70]

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[65] D. Gibbs (2002), *Local Economic Development and the Environment,* Routledge, New York, pp. 7-8

[66] Papper, *supra* note 58, pp. 3-5; See also A. P. Mol, "Ecological modernization as a social theory of environmental reform", in M. Redclift and G. Woodgate (2010), *The International Handbook of Environmental Sociology, Second Edition* , p.68

[67] A. P. Mol, "Ecological modernization: industrial transformations and environmental reform", in M. Redclift and G. Woodgate (1997), *The International Handbook of Environmental Sociology,* Edward Elgar Publishing Limited, p. 141

[68] Mol, *supra* note 66, p. 68

[69] Christoff, *supra* note 58

[70] W. M. Adams (2001), *Green Development: Environment and Sustainability in the Third world*, London, Routledge, 2nd Ed., p. 112

The theory of ecological modernization lends valuable insights about how to bring reform in environmental regulatory system of a state whose interest is to protect its environment while enhancing investment. In countries like Ethiopia, where there is extreme level of poverty, natural resources need to be mobilized to boast the economy. As there are limited financial capacities, it can be appropriate to pursue policies that promote resource utilization and inject of foreign capital, in the form of investment, into the economy. Accordingly, instead of disputing on the suitability of industrialization for poverty alleviation, the issue must focus on how to achieve environmentally sound production as well as consumption. Stated otherwise, the objective of this research is not to refute the policies in Ethiopia that promote investments in the floriculture sector, but to indicate limitations in the regulatory systems aimed at achieving environmental preservation. The theories and principles propagated by ecological modernization can inform legal measures by providing directions for actions and rational environmental decision making in Ethiopia. For instance, regulatory requirements to assess environmental impacts of investment projects prior to their implementation and take precautionary measures aimed at minimizing impacts are important to safeguard the environment against degradation.

As will be seen more fully in the chapters of the thesis flower production processes in Ethiopia expose water resources, aquatic life and soil to degradation. It is important to highlight on the need to transform production processes that bring these environmental impacts into more sustainable ones by employing better innovative technologies. However, as indicated in Chapter Two, such technologies are said to be inaccessible to producers in developing and least developed countries due to cost and limited expertise. The research investigates whether this holds true for producers in the Ethiopian flower industry.

It is necessary to introduce a framework within which governments and private actors share responsibilities to protect the environment and thereby minimize

impacts in host countries.[71] Traditionally, the responsibility to steer socially undesirable behaviour rests on governments, which was found to be ineffective.[72] This approach of regulation called 'command-and control' imposes "specific, unyielding mandates on firms in an effort to solve public problems".[73] They require regulated entities to take specific actions or achieve desired outcomes. The approaches "have frequently been viewed as either blunt and costly or too rigid or inflexible to deal with complex, changing regulatory problems".[74] Black points out the problem in this form of regulation:

> The instruments used (laws backed by sanctions) are inappropriate and unsophisticated (instument failure), that government has insufficient knowledge to be able to identify non-compliance (information and knowledge failure), that implementation of the regulation is inadequate (impleentation failure), and that those being regulated are insufficiently inclined to comply, and those doing the regulating are insufficently motivated to regulate in the public interest (motivation failure and capture theory).[75]

A system of governance that suits the growing demand involves different actors working together for the same goal. This is referred to as *multilevel environmental*

[71] Goldenman argues that "the rapid pace of globalisation, the competition for FDI, and the sheer size of many multinational enterprises can make it difficult for a host country acting alone to set in place adequate environmental controls over incoming FDI". G. Goldenman, "The Environmental Implications of Foreign Direct Investment: Policy and Institutional Issues", in OECD (1999), *Foreign Direct Investment and the Environment,* OECD, Paris, p. 85

[72] P. K. Wapner (1996), *Environmental Activism and World Civic Politics,* State University of New York Press, 1996, pp. 17-18

[73] See C. Carrigan and C. Coglianese, "The Politics of Regulation: From New Institutionalism to New Governance", *Annual Review of Political Science* (2011), Vol. 14, p. 114.

[74] *Ibid*.

[75] Julia Black (2002), *Critical Reflections on Regulation*, the Centre for Analysis of Risk and Regulation at the London School of Economics and Political Science, London, p. 2. Black calls command and control regulation "centred" as the state is "the only commander and controller" and it is "uni-lateral in its approach (government telling, others doing)". *Ibid*. Carrigan and Coglianese point out that researches on regulation follow two paths: new institutionalism and new governance. The former concentrates on the relationships between electorally accountable institutions (politicians) and the regulators who draft and enforce binding rules while the later focuses on the interaction between regulators and the entities they seek to govern. It is the scholarly enquiry of new governance that has more relevance for the discussion in this research. See Carrigan and Coglianese, *supra* note 73, pp. 107-129

governance in this research.[76] This concept has two dimensions. First, tasks related to environmental protection are also assumed and carried out by actors other than government institutions (such as companies and NGOs). Instead of sticking to the conventional command and control approach, the government introduces environmental regulatory mechanisms, which give wider room for non-governmental actors to participate in the process of controlling the environmental impacts of investment. Second, there will be variety of forms of decision making, policy making, regulation and steering, characterized by a complex interweaving of actors operating at different levels. Accordingly, regulation is not merely made by states, but also by other bodies and includes all mechanisms of social control.

3.4.2. Multilevel Environmental Governance

3.4.2.1. The Role of the State in Ensuring Environmentally Sound Investment

Effective governance is at the heart of good systems of environmental management and investment. The first action towards regulating the environmental impacts of investment is expected to come from countries hosting investment. States must introduce appropriate policy frameworks and strengthen their institutional capacity both at national and local levels in order to ensure that investment contributes to sustainable development. It is mainly the responsibility of the state to establish a broad development policy with social, ecological and economic objectives.[77] Since

[76] See Katarina Eckerberg and Marko Joas, "Multi-level Environmental Governance: a concept under stress?", *Local Environment* (2004), Vol. 9, No. 5, pp. 405-412. A closely related concept to this is "decentred" regulation which Black explains as something not exclusively or predominantly tied to the state but the role of other actors is harnessed to further public policy objectives. See Black, *supra* note 75. Black further explains that "in a decentred understanding of regulation, it is not assumed that any one actor has all the information necessary to solve social problems; it is not a question of industry having, government needing. Rather, no single actor has all the knowledge required to solve complex, diverse and dynamic problems, and no single actor has the overview necessary to employ all the instruments needed to make regulation effective". *Ibid*., pp. 3-4. For detailed discussion on the "decentred" regulation see Julia Black, "Decentring Regulation: Understanding the Role of Regulation and Self-Regulation in A 'Post-Regulatory' World", *Current Legal Problems* (2001), Vol. 54, No. 1, pp. 103-146

[77] The principle of integrated decision-making demands states to pay equal attention to and consider each goal (i.e. environmental protection, economic development and social development) in development related decision-making processes. The Rio Declaration reinforced the principle in its statement that, "in order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it". Rio Declaration, principle 4. In the same vein, Agenda 21, under Phar. 8.4., states that national

the problems of environmental degradation and poverty are interrelated, during early stage of policy drafting, it is essential to consider both interests together.[78]

It is clear that government must perform three tasks in regulating the environmental impacts of investment: determine what society's goals should be; decide what specific steps should be taken to achieve them; and ensure that large numbers of firms are complying with requirements set in the regulation.[79] It can use market-based mechanisms, employ environmental regulations and/or engage the public and firms.[80] States can adopt a mixture of these approaches to safeguard the environment against harms caused by economic activities. As Black notes policy-makers, instead of using just one regulatory instrument to address a problem, should use "a range of instruments in a combination which will be multifaceted and hope to minimize, or self-correct, unintended consequences: instrument mix is the new buzz phrase".[81]

Regulatory rules define the basic framework within which investors must operate when producing and selling their goods and services. It is important to put in place stronger and comprehensive regulatory standards in order to bring about improved environmental performance. Rules generally need to be precise, accessible and intelligible.[82] Regulatory frameworks must be predictable and applied consistently to all investors without discrimination. Rules also lay down enforcement strategies used to achieve compliance. Some discretionary power about how to achieve regulatory standards should be left to regulated firms in implementing the

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governments need to 'integrate environmental and development decision-making processes'. Such integration need to be made "through appropriate legal and regulatory policies, instruments and enforcement mechanisms. See Agenda 21, Paragraph 8.16

[78] This helps essentially to minimise potential environmental harms and to take environmental protection measures in relation to development project intended to takes place. Sustainable development demands not only environmental and social goals to be integrated into a county's economic development policies but also the simultaneous consideration of the goals in a particular decision making process. This enables to bring environmental and/or social issues into the attention of the decision maker.

[79] Fiorino, *supra* note 56, pp. 190-191

[80] World Bank (1997), *Five Years after Rio: Innovations in Environmental Policy,* World Bank, Washington DC., pp. 5-14; Scholars identify different models and approaches of regulation. See Tony Prosser, "Models of Economic and Social Regulation" in Dawn Oliver, *et al* (2010), *The Regulatory State: Constitutional Implications*, Oxford University Press, New York, p. 37

[81] Black, *supra* note 76, p. 113

[82] Robert Baldwin, "Why Rules Don't Work, *Modern Law Review* (1990), Vol. 53, No. 3, pp. 321-337

standards. This can enhance the role of regulation in bringing win-win solution through "granting firms the flexibility to discover least-cost solutions, keeping the transaction costs of permitting and documentation to a minimum, and promoting the integration of environmental decision making into long-term business planning".[83] In relation to this is the notion of 'really responsive' regulation which refers to the strategy of "applying a variety of regulatory instruments in a manner that is flexible and sensitive to a series of key factors".[84] These include: the behaviour, attitude and culture of the regulated firm; institutional environments in which regulation takes place; the performance of the control regime; and changes in regulatory priorities and objectives. [85]

A wide range of enforcement and intervention tools and strategies can be employed with respect to regulating environmental risks.[86] Not only penalties and sanctions, but also incentives, i.e. positive reinforcement mechanisms, such as giving recognition and different treatment for good performers, through for example tax exemption, can be used as enforcement strategies. These help to avoid adversarial relationships between the government and regulated firms, and build regulatory environment with cooperation, responsibility sharing, and collaboration for solutions.[87] Depending on circumstances, however, government may need to use coercive actions against companies that fail to obey regulations. Generally, the

[83] Fiorino, *supra* note 56, pp. 222-223. Firms may agree to more stringent performance standards if they have the discretion to decide about how to meet those standards.

[84] Julia Black and Robert Baldwin, "Really Responsive Risk-Based Regulation", *Law and Society*, (2010), Vol. 32, No. 2, p. 182

[85] There are five fundamental tasks in this regulatory approach: (1) detecting undesirable or noncompliant behaviour; (2) responding to that behaviour by developing tools and strategies; (3) enforcing those tools and strategies on the ground; (4) assessing their success or failure; and (5) modifying approaches accordingly. See Robert Baldwin and Julia Black, "Really Responsive Regulation", *Modern Law Review* (2008), Vol. 71, No. 1, pp. 59-94; Baldwin, *supra* note 82

[86] Some of these include: sanction, such as prosecution, fine or notice; screening used to identify activities that require authorization and permit; monitoring strategies involving inspectors and regulatory auditors, third-party agents or rely on the firm; engagement with interested groups such as industry associations, NGOs and local communities; and incentive strategies. Fiorino, *supra* note 56, pp. 193-194. Regulations need be designed to encourage behaviour by providing positive as well as negative incentives. For detailed discussion about regulation enforcement strategies see J. Black and R. Baldwin, "When risk-based regulation aims low: Approaches and challenges", *Regulation & Governance* (2012), Vol. 6, No. 1, pp. 2–22

[87] Fiorino, *supra* note 56, p. 223; Collaboration is desirable to promote dialogue, trust and mutual learning. Similarly, strategies based on learning are preferred over bureaucratic control. Incentives encourage actors to evaluate and improve their performance.

capacity of the state to formulate, implement and enforce effective environmental regulations on any form of investment, whether domestic or foreign, is important.[88]

Limited financial and institutional capabilities can be constraining factors to effectively enforce regulation especially in developing countries. As Black and Baldwin note "regulators usually find that they have more to do, and more issues to respond to, than time or resource allows".[89] Scholars suggest a regulatory strategy which bases itself on assessment of risks of non-compliance and allocation of resources through providing prioritized attention to the highest risks.[90] In risk-based frameworks, regulators first identify the risks that have to be managed and determine the types of risks and their levels of tolerance. It also involves assessment of hazards and their likelihood of occurrence. Based on these assessments, regulators assign scores to firms or activities which will be used to allocate supervisory, inspection and enforcement resources.[91] This strategy has been adopted to supervise regulatory implementations in areas of environment, food safety, occupational health and safety as well as financial services.

Efforts to balance development objectives with environmental protection goals require collaboration between the government, the business sector and NGOs. There are multiple actors such as communities and NGOs, which exert pressure on firms to act responsibly towards the environment. "Regulatory pressure from government is necessary, but it is not the only influence on firms".[92] For example, activists' pressure on industries to improve their environmental performance is important. NGOs historically played critical role in maintaining pressure for environmental progress.[93] The government must establish and maintain an enabling framework that allows other actors to play roles in the regulation of investment.

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[88] Zarsky, *supra* note 36, p. 49
[89] Black and Baldwin, *supra* note 84, p. 181
[90] *Ibid*., Julia Black, "The Emergence of Risk-based Regulation and the New Public Risk Management in the United Kingdom", Public Law, pp. 512-548.
[91] Black and Baldwin, *supra* note 84, pp. 184-185
[92] Fiorino, *supra* note 56, p. 193
[93] *Ibid*., p. 192. The state can regulate the environmental impacts of investment indirectly through introducing policies that encourage NGOs and the public to engage in environmental management.

3.4.2.2. Corporate Social Responsibility: Self- Regulatory Initiatives

Currently, large firms, especially transnational corporations (TNCs), are signing up to codes of practices in order to minimise environmental and social impacts of their undertakings. Codes of practices, mostly issued by individual corporations, industry associations, or international organisations, incorporate, among other things, environmental and labour standards and a commitment to protect human rights and to refrain from bribery.[94] Corporate initiatives towards self-regulation of environmental and social impacts are often expressed in the form of corporate social responsibility (CSR). CSR refers to "greater responsiveness on the part of companies to societal and stakeholder concerns; integration of social and environmental considerations in business operations; voluntary initiatives that go beyond both philanthropy and standards embodied in law; and 'doing no harm'".[95]

The presence of foreign companies in developing countries brings both hopes and fears. They can create employment opportunities and help generate government revenues. Governments in these countries, however, have limited capacity to regulate investment in most of the circumstances. They refrain from regulating companies for fear of losing their investment to other countries even where they have the capacity. They can also successfully manipulate regulatory agencies to weaken the implementation of regulations.[96] However, if companies accept responsibilities about the environment and implement similar rules and procedures across their affiliates, their contributory role for national development will be elevated.

There are other considerations that are profoundly different from government environmental regulations. This is the role and significance of voluntary

[94] Example of code of practices include: the OECD Guidelines for Multinational Enterprises; Sustainable Reporting Guidelines; United Nations Global Compact Principles. Code of Practices that have relevance for the floriculture industry are summarised in Chapter Eight.

[95] P. Utting and J. C. Marques (2010), *Corporate Social Responsibility and Regulatory Governance: Towards Inclusive Development?,* UNRISD, Palgrave Macmillan, p. 2

[96] This refers to concept of "regulatory capture" which implies that "the regulated firm have, as it were, made war on the regulatory agency and won the war, turning the agency into more vassal". See Richard A. Posner, The Concept of Regulatory Capture: A short, Inglorious History", in Daniel Carpenter and David A. Moss (2013), *Preventing Regulatory Capture: Special Interest Influence and How to Limit It*, Cambridge University Press, pp. 49-56, p. 49

environmental programmes that offer flexibility in addressing environmental problems. Participants are free to decide about the methods that they apply to meet the goals. Compared with the traditional command-and-control regulation, voluntary environmental initiatives are more cost-effective, "because they provide firms with the flexibility to tailor their pollution control strategies to meet the needs of their operations".[97] Apart from this, voluntary environmental initiatives are advantageous for government authorities as they help to create a sense of shared responsibility between different actors. As Fiorino notes: they "allow policy makers to adopt more quickly to new issues than a conventional regulatory approach would... when combined with either the right sticks or carrots... and designed properly, they offer a valuable and effective addition to conventional regulation".[98] The method becomes more effective if used in combination with other instruments.

Firms that implement voluntary corporate social responsibility can be advantageous from different perspectives.[99] Better environmental performance, with improved quality control of final products, efficient use of resources, and waste minimisation, can lead to increased profitability. Environmentally responsible business practice creates opportunities to reduce costs and increase market share. Firms, which implement environmental management systems, can build reputation and have better access to export markets. [100] They can establish good relationship with the community within which they operate business.[101]

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[97] M. Khanna and K. Brouhle, "The effectiveness of voluntary environmental initiatives", in M. A. Delmas and O.R. Young (2009), *Governance for the Environment: New Perspectives,* Cambridge University Press, p. 145; Voluntary programs intend to bring improved behavior through positive rather than negative incentives. In this programs government seek to encourage socially desirable behavior by offering educational sources, financial assistance, awards and certifications and exemptions from requirments. However, because of the voluntary nature of the programs, it may be difficult to prove that they actually cause companoer to improve their behavior. See Carrigan and Coglianese, *supra* note 73, pp. 107-129

[98] Fiorino, *supra* note 56, p. 126

[99] *Ibid*., p. 16; Utting and Marques, *supra* note 95, p. 2; J. Huber, Towards Industrial Ecology: Sustainable Development as a Concept of Ecological Modernization, *Journal of Environmental Policy and Planning* (2000), Vol. 2, No. 4

[100] Huber, *supra* note 99. However, as discussed in Chapter Two and Chapter Eight of this research, it is doubtful that customers pay premium price for environment friendly products.

[101] Compliance with voluntary environmental responsibility programmes helps companies to check their own actions and avoid future liability. It "enables firms to signal their commitment to environmental responsibility and mitigate public concerns about their environmental impacts while

However, voluntary environmental programmes should not completely replace government policies and regulations. Self-regulatory efforts can only supplement for a state's role in regulating investment. Carrigan and Coglianese argue that alternatives to the traditional form of regulations "can and apparently do sometimes to advance public policy goals while reducing the costs and informational demands on government that are associated with more traditional means-based regulation and performance standards".[102] Yet "self-regulation is not a panacea... it is at most just a partial solution, and that only if accompanied by robust disclosure and enforcement backed by social actors and governments".[103] There are concerns that self-regulation can become "mere symbolic gestures" and undermine the likelihood of the required government interventions where policy makers mistakenly conclude that firms adequately addressed the problem.[104] The effectiveness of self-regulation depends on the possibility of overcoming problems associated with compliance, and this calls for the involvement of the state and other actors. Voluntary programmes usually demand going beyond compliance with government regulatory requirements, but host country regulations remain important as they set minimum social and environmental protection standards.[105] The government can strengthen the effectiveness of voluntary environmental performance programmes through demanding information disclosure to the public and putting in place appropriate policy frameworks to uphold the functionality of social mobilization.[106]

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possibly pre-empting stringent environmental regulations". Khanna and Brouhle, *supra* note 97, p. 145.

[102] Carrigan and Coglianese, *supra* note 73, p. 119

[103] D. L. Brown and N. Woods (2007), *Making Global Self-Regulation Effective in Developing Countries,* Oxford University Press, New York, p.5

[104] Carrigan and Coglianese, *supra* note 73, p. 118; See also Black, *supra* note 76, pp. 103-146

[105] M. Hopkins (2004), *Corporate Social Responsibility: an Issue Paper*, Working Paper No. 27*,* Policy Integration Department, World Commission on Social Dimension of Globalization, ILO, p.6

[106] See Brown & Woods, *supra* note 103. In addition to this, such internal governance tools as environmental auditing and reporting, environmental management system and independent certification give force to voluntary self-regulation programmes. European Commission (2001), *Promoting a European framework for corporate social responsibility, Green Paper*, *COM(2001)366,* 18 July 2001; T. Donaldson and L. E. Preston, The Stakeholder Theory of the Corporation: Concepts, Evidence, and Implications, *Academy of Management Review* (1995), Vol. 20, pp. 65–91; K. Buhmann, Corporate social responsibility: what role for law? Some aspects of law and CSR, *Corporate Governance (*2006*),* Vol. 6, no. 2, pp. 188-202; M. E. Porterand M. R. Kramer, The Link

3.4.2.3. The Role of the Civil Society

Environmental activists, non-governmental organisations (NGOs) and community play crucial role in environmental protection initiatives. [107] They pressure government authorities to work for environmental well-being in varies ways, such as through demanding disclosure of environment related information to the public. NGOs can influence environmental policies through promoting support or opposition.[108] They promote communication, monitor information, and publicise non-compliances. They easily catch media attention; create networks with organisations working for similar objectives and lobby policy changes.[109]

Environmental activists watch over business entities and expose the social and environmental externalities of their activities to the public. NGOs raise public awareness about the trends and consequences of economic activities, including investment. When companies fail to comply with their own code of conducts, they influence them to work for improvements. Yet NGOs must act independently and free of interference. Princen and Finger stress that "to simultaneously reach up to the states and international institutions and down to the local communities, such agents must establish themselves as independent actors".[110]

Public participation is a basic principle regarding local community involvement in environmental protection efforts. It demands environmental decision makers to consult and engage the community whose interest might be affected in a decision making process. Principle 10 of the Rio Declaration underscores that "environmental issues are best handled with the participation of all concerned

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Between Competitive Advantage and Corporate Social Responsibility, *Harvard Business Review* (2006), December Issue, p. 82

[107] T. Princen and M. Finger (1994), *Environmental NGOs in World Politics: Linking the local and the global,* Routledge, New York, 1994, p. 11

[108] T. Princen, "NGOs: creating a niche in environmental diplomacy", in T. Princen and M. Finger (1994), *Environmental NGOs in World Politics: Linking the local and the global,* Routledge, New York, p.34

[109] Wapner, *supra* note 72, p. 3

[110] Princen and Finger label NGOs as 'agents of change' because of two reasons. First, organising provides the opportunity to challenge effectively the actions of government authorities as well as companies, and to come up with creative solutions. Second, the failures of governments to undertake effectively the responsibility to steer environmentally harmful behaviours provides the opportunity for NGOs to assume the critical role of agents of change. Princen and Finger, *supra* note 107, p. 11

citizens, at the relevant level".[111] The role public participation plays in environmental protection and development initiatives can be seen from three perspectives.[112] First, it helps to legitimise decision-making and, thereby, reduces the level of conflict. Second, it gives the opportunity for the government to obtain additional ideas and information directly from the public and this will in turn have positive contribution for the quality of the decision. Informed and accountable environmental decision-making requires the integration of expert opinions with public views. This helps to overcome uncertainties and limitations in scientific knowledge. [113] Third, it enables citizens learn about the potential environmental problems that they likely face. Thus, public participation serves as an instrument to protect the interest of stakeholders.

Conclusions

This chapter highlighted factors that are relevant in most developing and least developed countries in the process of achieving development through attracting investment to their economies. Following the adoption of structural adjustment policies, these countries have been allowing inflow of capital and privatizing government owned enterprises. They provide different forms of incentives in order to guarantee the continuous flow of investments. Consequently, investments flows have been increasing with some fluctuation. With similar trend, investment inflows to Ethiopia exhibited 26% growth in 2014. Growth is among other matters, due to different incentive packages, political stability and overall investment friendly environment.

[111] Rio Declaration, Principle 10

[112] F. H. Coenen (2008), *Public Participation and Better Environmental Decisions: The Promise and Limits of Participatory Processes for the Quality of Environmentally Related Decision-making,* Springer, p. 2

[113] "Including the views of ordinary citizens in environmental policy-making helps to avoid the dangers of 'technocratic decision-making', where policy formation is based on expert assessment only, rather than on expert knowledge combined with stakeholder views." M. Welp, B. Kasemir and C. Jaeger, "Citizens' Voices in Environmental Policy: The Contribution of Integrated Assessment Focus Groups to Accountable Decision-Making", in F.H. Coenen (2008), *Public Participation and Better Environmental Decisions: The Promise and Limits of Participatory Processes for the Quality of Environmentally Related Decision-making,* Springer, p. 22

The chapter explored both the contribution of investment to sustainable development and the challenges that it sets for the later. Foreign direct investment can contribute for better environmental management practices for host countries, but depends on factors such as effective regulatory and institutional capacities. The role of investment in reducing poverty through employment opportunity is highlighted, but lack of institutional capacity in host countries to regulate investment can exacerbate environmental problems, such as overexploitation of natural resources and pollution. The chapter discussed the interest to remain competitive in attracting foreign investment coupled with the assumption that companies always prefer to invest in countries with lax regulation has been leading countries to disregard the protection they should accord to the natural environment. This attitude is found to be one of the factors for the Ethiopian regulatory authorities to become reluctant from effectively enforcing environmental standards.

A development policy targeted only towards bringing economic development, through attracting investment, cannot be sustainable. The quest for sustainability demands a country's interest to economic development to be reconciled with environmental protection goals through striving to achieve the two goals simultaneously. In this respect, effective regulatory mechanisms must be put in place. The chapter discussed the theory of ecological modernization to borrow ideas on how to achieve reconciliation between economic development and environmental protection. In particular, it is pointed out on the importance of introducing multi-level environmental governance within which different actors- governments, NGOs, the community, and business firms- work towards the goal of environmental protection. Within this framework, all these actors need to play roles in guiding environmentally harmful behaviours towards environmentally responsible ones. The respective roles and responsibilities of the actors are discussed in detail. Collaboration between different actors, better than unilateral action, helps to achieve the goal of environmental protection.

The principles propagated by ecological modernization, such as precautionary principles and risk analysis, are basic environmental regulation pillars. Whether

these principles are enshrined in the Ethiopian environmental laws and effectively implemented in the regulation of environmental impacts of floricultural companies deserves further investigation. The next chapter introduces the Ethiopian environmental law regime, followed by chapters that specifically discuss the regulation of pesticides and wastes, water resources and aquatic life, and soil. Chapter eight focuses on company self-regulation and private environmental standards that have relevance for the flower industry. Ethiopia is a useful case study of an African country that has set a pathway for its development and, from the experience, it is possible to draw valuable lessons for other countries.

Chapter Four: Environmental Governance in Ethiopia: an Introduction

Introduction

As we have seen from Chapter Three of the thesis, the quest for poverty reduction through reaping the benefits of direct investment can put developing and least developed countries in a position of compromising the protection they should provide to the environment. However, an economic development cannot be sustainable unless the same level of attention is paid for environmental protection. The attainment of sustainable development requires striking a balance between economic development and environmental protection. This balance is not easy in terms of agricultural developments and may go largely unnoticed when compared to large scale industrialisation. Thus, environmental protection is not something that countries should disregard for the sake of economic development. In Ethiopia, however, the Constitution, the environment policy document and environmental protection laws promote sustainable development and require environmental consideration in all programs, projects and activities. The Investment Proclamation declares that the ultimate objective of investment in the country is achieving sustainable economic and social development. The country also adopted a Climate Change Resilient Green Economy Strategy, an important development from the perspective of sustainable development.

The preceding chapter stressed the role of multilevel environmental governance for sound environmental management, which gives recognition, responsibility and standing for non-state actors. It provided a brief explanation about environmental governance and how this is different from 'command and control' form of regulation. For the purpose of this research, 'Environmental governance' refers to regulatory processes, mechanisms and organizations through which different actors influence environmental actions and outcomes. In the processes, the government is not the only controlling actor and more attention is given to interactions between various stakeholders- the state, businesses, communities and civil society. The term 'multi-level' in governance indicates "the mutual dependency between the various

tiers of government" and "the need for coordination and to the various levels of aggregation at which non-governmental bodies involved in governance operate".[1] Unlike in the traditionally conceived purpose of environmental regulation, which forces entities to internalise damage through mechanisms like monitoring and sanctions, responsibilities to achieve regulatory goals are shared with regulated entities.[2] Based on the acquired understanding, the present chapter investigates into the system of environmental governance in Ethiopia. Accordingly, the existing policy and legal instruments, and the institutional framework for environment protection activities are introduced and briefly assessed. The chapter first outlines the main environmental problems in Ethiopia. Deforestation and soil erosion are long lasted problems while pesticides and other agro-chemicals are recent issues of concern due to growing application to boost agricultural productivity and in commercial farming.

The Ethiopian environmental Policy and Strategy documents appear to suggest that non-state actors should play role in environment protection and regulation. However, the roles and responsibilities of these actors and their functional linkages with environmental protection agencies are not well established in legislation limiting their role in environmental governance. Environment protection tasks are thus mainly carried out by government institutions, both at the Federal and Regional levels. However, there are limited capabilities (financial, human resource, technological, etc) with government institutions to effectively regulate the environment. This can negatively affect the country's aspiration to build a green economy and achieve sustainable development.

[1] Peter P. J. Driessen et al, "Towards a Conceptual Framework for The Study of Shifts in Modes of Environmental Governance – Experiences From The Netherlands", *Environmental Policy and Governance* (2012), Vol. 22, pp. 144–145; Maria Carmen Lemos and Arun Agrawal, "Environmental Governance", *Annual Reviews of Environmental Resources* (2006), Vol. 31, pp. 297–325.
[2] Daniel **J.** Fiorino, *"*Rethinking Environmental Regulation: Perspectives on Law and Governance", *Harvard Environmental Law Review* (1999), Vol. 23, pp. 441-469

4.1. Main Environmental Problems and Challenges in Ethiopia

The Environment and natural resources of Ethiopia have been under degradation for centuries. Population growth and climate change are cited as the main causes for the problems.[3] In rural areas, the search for additional cultivable land aimed at accommodating population increase has been leading to massive deforestation and de-vegetation.[4] Forests have been cleared to satisfy the demand for timber, lumber and other products exposing the soil for wind and water erosion. Consequently, in rural areas, soil nutrients are highly depleted. When the land degrades, vegetation becomes increasingly scarce, water courses dry up and soils become thin and stony losing productivity. Environmental decline due to land degradation adversely affects the well-being and livelihood of individuals as it leads to food insecurity and persistent poverty. In Ethiopia, these economic implications are serious because the majority of the people (79%) depend on agriculture for livelihood. Poverty, famine and drought are recurring problems in the country and are additional challenges to environmental management. In order to survive people disregard the environment and keep on depleting it further. The issue of soil degradation is further discussed in Chapter Seven.

Until recently, pesticides and other agro-chemicals were not issues of concern in Ethiopia due to absence of modern commercial farming.[5] But, currently they are applied abundantly in rural areas as part of the government's plan to increase agricultural productivity and achieve food self-subsistence. The amount of agro-chemicals entering the country is also increasing with the rise of the floriculture sector. Obsolete pesticides and contaminated containers have been posing threat to the environment and human health. Pesticide chemicals with hazardous nature were found in water bodies massively used for irrigation and in areas where flower

[3] Girma Hailu (2000), Environmental Law: Ethiopia, International Encyclopaedia of Laws, Kluwer Law International: Leuven, P. 23-24

[4] From 2001-2009 alone cropland increased at a ratio of 0.7 ha of deforestation for 1 ha of cropland. See FDRE (2011), Ethiopia's Climate-Resilient Green Economy Green economy strategy, Addis Ababa, p. 16 http://www.undp.org/content/dam/ethiopia/docs/Ethiopia%20CRGE.pdf, accessed on 23 March 2016

[5] Hailu, *supra* note 3, p. 23

are cultivated. As will be seen these issues are further elaborated in Chapter Five and Six of this research.

Environmental problems in urban areas have different faces and mainly relate to waste disposal issues and pollution. Municipal waste disposal facilities are bellow the standard and wastes are usually disposed on open field where they expose the population for health problems. Industrial establishments (textile, tannery and iron tools industries) located near the capital- Addis Ababa- release untreated effluents into the streams running through the city polluting river systems and underground water.[6] All these environmental problems can be indications of weaknesses and limitations in the country's environmental governance and regulatory system. In other worlds, inability to enforce legislation and absence of adequate room for civil society, pressure group and local community to participate in environmental regulation can be among the reasons for persisting environmental problems. Demarcating the environmental problem areas, this chapter simply introduces the country's governance system.

4.2. Legislative Powers

The FDRE Constitution created federal political governance in Ethiopia. Nine Regional States were defined on the basis of settlement patterns, language and ethnic identity.[7] Accordingly, there is a two-tier government structure-Federal and Regional. The Federal Government is mandated with defence, foreign affairs, immigration, currency and criminal matters and authorized to handle any trans-regional issues. It is within the power of the Federal Government to legislate laws on matters related to utilisation and conservation of land and other natural resources, including rivers and lakes crossing the boundaries of the national territorial jurisdiction or linking two or more States.[8] Federal systems may give rise to distinctive regional arrangements and Ethiopia is no exception.

[6] *Ibid*., p. 23
[7] FDRE Constitution, 1995, Article 45 and 46
[8] *Ibid*, Article 51

Regional States have power over political, economic and social affairs in their jurisdictions.[9] They formulate and execute regulations, development policies, strategies and plans specific to their jurisdictions. Since it is within the mandate of the Federal government to enact laws on matters related to utilisation and conservation of land and other natural resources, the power of Regional States is limited to administration of the resources in accordance with federal laws.[10]

The fact that laws are issued by federal law making organ but implemented by regional executive bodies can trigger question on the effectiveness of the centralised regulatory arrangement. Yet, there are some flexibilities in the system as regional states retain the power to formulate regulations and strategies important to implement proclamations (legislations enacted by the Federal government). In effect, they can decide on the kinds of implementation strategies (e.g. market based or voluntary) that should be followed to achieve legislative objectives. Instead the main problem lies with implementation capacity and inter-state competition to attract investment and bring economic growth within state jurisdictions. Effective implementation of the law requires equipping regulatory bodies with the necessary financial and infrastructural resources, which is lacking in the Ethiopian case as discussed bellow. Regional states also compete to attract investment and this can restrict them from strictly regulating the environment and natural resources.

4.3. Legislative and Policy Frameworks

Various policies, legal instruments and strategic documents were issued in Ethiopia to ensure better environmental governance and protection. These include: the FDRE Constitution; Proclamations on a range of environmental issues; various sectoral proclamations that are related to water, forest, energy, etc; the Environmental Policy of Ethiopia; the Conservation Strategy of Ethiopia; and various Regional Laws. The following Section provides an overview of the relevant information and offers an analysis of the main legislative and policy documents.

[9] *Ibid*., Article 52
[10] *Ibid*.

4.3.1. The FDRE Constitution

The FDRE Constitution, the supreme law of the land in Ethiopia, recognizes the right to a clean and healthy environment under Article 44(1). It states that the government "shall endeavour to ensure that all Ethiopians live in a clean and healthy environment".[11] Guaranteeing the right to improved living standards and to sustainable development under Article 43(1), the Constitution demands the protection of the environment against destruction during design and implementation of development programme and projects.[12] It further requires that international agreements concluded by the country should uphold the right to sustainable development.[13]

It is highlighted in Chapter Three that there is a growing importance to involve non-state actors, including local communities and NGOs, in environmental affairs. This is partly due to the complexity of environmental management and limited capacity of governmental agencies. The participation of actors, other than the government, in environmental matters affecting their interest and the environment is basic component of modern environmental governance. In light of this, the Constitution provides that "people have the right to full consultation and to the expression of views in the planning and implementations of environmental policies and projects that affect them directly".[14] Communities at local level are thus main stakeholders whose decisions are required for any action affecting the environment and their interest.

4.3.2. Policies and Strategies

With the view of amplifying the Constitutional provisions on environmental protection, national policies and strategies on environment management and protection were formulated in Ethiopia. Two documents that address environmental issues in a holistic manner were approved. These are: the Environmental Policy of Ethiopia and the Conservation Strategy of Ethiopia.

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[11] *Ibid*., Article 92 (1)
[12] *Ibid*., Article 92
[13] *Ibid*., Article 43(3))
[14] *Ibid*., Article 92(3)

Ethiopia being one of the poorest nations of the world, a number of steps has been taken to hasten economic development and improve the livelihood of citizens. The economy was liberalized in order to boost growth through ensuring flow of capital into and out of the country. The government enhanced private sector development realizing the role of the private sector in addressing the challenges of unemployment and poverty. At the same time, environmental sustainability and sustainable development are increasingly promoted in parallel with conventional economic goals. In line with this, the 1997 Environmental Policy of Ethiopia is aimed at guiding all activities related to environmental protection. The overall policy goal is:

> to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs.[15]

The policy document promotes sound management and use of resources which are vital components to achieve sustainable development. The document also incorporates specific policy objectives[16] and key guiding principles.[17] In addition, issues related to soil and sustainable agriculture, forest resources, biodiversity, water resources, minerals, waste, pollution and climate change are addressed.

[15] FDRE (1997), Environmental Policy of Ethiopia, Addis Ababa, p. 3

[16] The specific objectives include: to ensure that essential ecological processes and life support systems are sustained; that biological diversity is preserved; and that renewable natural resources are used in such a way that their regenerative capacity are maintained; to ensure that the benefits of exploitation of non-renewable resources are also extended to the future generation; to prevent the pollution of land, air and water; to ensure people's participation in the eco-management; and to enhance public awareness and understanding about the links that exist between development and environment. *Ibid*., pp. 3-4

[17] The key guiding principles include: the development, use and management of renewable resources need to be based on sustainability; the use of non-renewable resources needs to be minimized and where possible their use should be extended through recycling; when a compromise between short-term economic growth and long-term environmental protection is necessary, a decision should be in favor of the later; and environmental protection should be made an integral part of development planning. *Ibid*.

The second document, the National Conservation Strategy of Ethiopia, provides baseline information on potential natural resources, identifies the environmental challenges of the country, policy gaps and intervention areas. It also incorporates guiding principles, strategies for environmental management, and institutional arrangement. The strategy is prepared in five detailed volumes dealing with different aspects of conservation that must be implemented in the country.

4.3.3. Major Ethiopian Environmental Laws

The Policy and Strategy documents discussed above were followed by environmental legislation relating to different aspects of environmental protection. There are now proclamations on a wide range of issues such as radiation protection, wildlife conservation and utilisation, forest conservation and utilisation, bio-safety, solid waste management.[18] The main environmental laws of the country that have relevance for the discussions in this research are the Environmental Pollution Control Proclamation No. 300/2002 and the Environmental Impact Assessment Proclamation No. 299/2002.

A. Environmental Impact Assessment

The national Conservation Strategy, Volume II, in the part dealing with the need to integrate environment with development, states:

> Any country can maximize economic growth over a very short term by depleting non-renewable resources, by harvesting more than the sustainable yield of its renewable resources (e.g. forests) and by disposing of wastes into ecosystems that cannot assimilate them and thus degrading its soil and aquatic resources. But basing economic growth on such a policy would be like building a house on shifting sand…. Pursuing a policy of environmentally unsuitable economic growth would thus only exacerbate the living conditions of today's poor and bequeath to future generations.

[18] Proclamation No. 571/2008; Proclamation No. 541/2007; Proclamation No. 542/2007; Proclamation No. 655/2009 ; Proclamation No. 513/2007

Therefore, there is a need to integrate environmental protection with development policies of the country. Environmental impact assessment (EIA) is an instrument that helps to achieve this goal. Proclamation No. 299/2002 has EIA made a mandatory legal prerequisite for the implementation of major development projects, programmes and plans. It states under Article 3 that "without authorization from the Authority or from the relevant regional environmental agency, no person shall commence implementation of any project that requires environmental impact assessment". In 2003 EIA Procedural Guideline was prepared partly to provide list of projects that require EIA. These include: agriculture, livestock, forestry, fishery, transport, mining, dams and reservoirs, tannery, textile, hydro-power generation and irrigation. As discussed in Chapter Six, investment in the floriculture sector requires full EIA, but the majority of the investments started operation without going through the procedure.

The Proclamation requires government agencies with the power to issue investment permit to ensure that the Authority (now the Ministry of Environment, Forest and Climate Change) or relevant environmental agencies authorized the implementation of the investment project. Under this arrangement, the Investment Agency can only issue investment license if the Environment Agency approves the implementation of the investment project. However, this requirement was overturned by Investment Proclamation No. 769/2012 which states that investment organs simply notify concerned institutions for follow up after issuing investment permit. [19] Thus, the Investment Agency can issue investment license without any requirement for EIA. Damtie and kebede argue that the new arrangement would not have been a problem if there was effective functional link and institutional strength to redress the procedural reversal, but "there have never been effective

[19] EIA was prerequisite to issue investment permit under the repealed Proclamation № 299/2002. Article 3 (3) of the Proclamation provides that: "Any licensing agency shall, prior to issuing an investment permit or a trade or an operating license for any project, ensure that the Authority or the relevant regional environmental agency has authorized its implementation." The new Investment Proclamation states under Article 16 (2) that: "The appropriate investment organ shall, after issuing the investment permit, notify the concerned institutions so that the latter could conduct the necessary follow up".

links" and coordination between the investment licensing institutions and the environmental protection organs.[20]

As of 2009 the power to review EIA reports was delegated to sectoral institutions by the Council of Minister's decision. This has put the credibility of the review process into question as sectoral institutions are with another mandate and they might give more attention to their mainline duties.[21] In other words, conflict of interest can possible arise if both regulatory and development powers are assigned to a single institution. EIA is an important procedure that helps to identify potential impacts of development activities and take appropriate mitigating measures that enable, for example, to eliminate overexploitation of resources or environmental pollution. Therefore, it is important to reconsider the delegation of review and approval of EIA studies to sectoral institutions.

B. Pollution Control

As indicated above pollution is a major problem in urban areas due to poor municipal waste management practices and wastes released from industrial establishments. It is also discussed that there are emerging concerns with wide application of pesticides resulting in pollution of water sources. Environmental Pollution Control Proclamation No. 300/2002 aims to control activities that are hazardous or potentially hazardous to human health and/or alter the quality of the environment by affecting its beneficial use. It is stated in the preamble part that the law was enacted because economic development activities can inflict harm on the environment and can be counter-productive and, therefore, it is important to eliminate or mitigate pollution, which is undesirable consequence of development activities. The proclamation authorizes environment protection agencies to take appropriate legal and administrative measures, including closure or relocation of enterprise, against a person that releases pollutants to the environment.[22] Any person engaged in any activity can be required to install a sound technology, apply

[20] Melese Damtie & Solomon Kebede (2010), *The Need for Redesigning and Redefining Institutional Roles for Environmental Governance in Ethiopia*, MELCA-Ethiopia Movement for Ecological Learning Community Action: Addis Ababa, p. 56
[21] *Ibid.*
[22] Pollution Control Proclamation No. 300/2002, Article 3 (2) & (5).

methods for waste recycling and clean up or pay the cost of cleaning up the polluted environment.[23] The Proclamation also incorporates provisions on the management of hazardous waste and municipal waste. Relevant provisions of the Proclamation are further discussed in the chapters dealing with pesticides regulation and water resource management. The Proclamation more or less addresses major issues and the main limitation could be the amount of fine prescribed for offenses which may not be enough to bring deterrence effect given the current high rate of inflation.

C. Code of Practice for the Floriculture Sector

The first two proclamations highlighted above are applicable to any kind of investment irrespective of its nature. In 2011, however, a regulation particularly concerned with the floriculture sector was issued with the objective to define and regulate the essential elements of environmentally sustainable and socially acceptable agricultural practices.[24] The regulation establishes a certification system that determines the level of compliance with environmental and social sustainability requirements. There are three levels of certification: Bronze, Silver and Gold. The Environment Protection Authority (now Ministry of Environment, Forest and Climate Change) is authorized to issue Certificates that remains valid for two years.[25]

The first level of certificate, Bronze Level, is a minimum standard that companies should comply with to engage in floriculture.[26] In order to obtain this level of certificate, companies are expected, among other things, to restrict themselves from using banned or un-registered agrochemicals; put in place environmentally sound waste management practices; assess risks related to environment and occupational safety; ensure safe agrochemical storage and use; and ensure good labour conditions. In order to monitor compliance with requirements, companies are required to put in place their own mechanisms that include organizational

[23] *Ibid*., Article 3 (3) & (4).
[24] Code of Practice of the Floriculture Sector Council of Ministers Regulation No. 207/2011, Preamble
[25] *Ibid*., Article 11
[26] *Ibid*., Article 5

structures within their institutions, such as farm safety officer, environment office and internal auditor. They are also required to measure, evaluate and report in relation to water and energy consumptions, agrochemicals use, and waste management.

In order to achieve Silver Level, companies need to be in a condition where they have fulfilled all the requirements of the Bronze Level.[27] The Regulation, under article 6 (2), boldly states that companies need to "meet good agricultural practices required by the prevailing international market"; “put in place an acceptable auditing system”; and “comply with good practices on post-harvest practices acceptable pesticide residue levels”. Each of these requirements is not clearly defined and this is one of the limitations of the Code. It can simply be said that companies will be awarded with silver level of certification if they actively engage in initiatives that conserve the environment and protect the rights of workers by going beyond what is required in the law.

Before attaining Gold Level, companies need to show that their flower cultivation practices are in compliance with requirements of Silver Level (Regulation No.207/2011, Article 7). Accordingly, companies that seek to obtain Gold Level Certificate need not only be abided by Ethiopian laws protecting the environment and the welfare of workers and international conventions ratified by the country, but also engage actively in good agricultural practices as the Silver Level demands. Additional responsibilities at this Level include supporting local communities through providing financial support, for instance, in school construction and/or such environmental conservation programmes as preventing soil erosion, afforestation, biodiversity conservation and improving river and groundwater qualities.

Generally, through requiring all companies engaged in floriculture to obtain the Bronze Level Certificate, the Regulation reinforces compliance with obligations established in other legislation, such as Pesticide Control and Registration Proclamation and Labour Proclamation. What is unique in this Regulation is it

[27] *Ibid.*, Article 6

encourages companies to go beyond the minimum legal requirement and engage in good agricultural practices. The system of certification invites companies to take part in the effort to achieve environmental sustainability within the sector and the requirements provide flexibility so that companies introduce agricultural practices suiting their situations. The certification system aims to provide information about compliance levels to customers. Chapter Eight discusses the effectiveness of the certification system. The code of practice is not yet entered into force and, like other environmental legislation, may not be effectively implemented within short period of time unless problems affecting its implementation are resolved.

4.3.4. International Conventions

Ethiopia has signed up to a number of multilateral environmental agreements and these have been ratified by Ethiopia. These include: the Convention on Biological Diversity; the Basal Convention on the Control of Transboundary Movements of Hazardous Wastes; the Vienna Convention and the Montreal Protocol for the Protection of the Ozone layer; the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; and the Stockholm Convention on Persistent Organic Pollutants. These international agreements are relevant to the discussion in this research because all international agreements ratified by Ethiopia are part of the law of the land [28] and they impose certain duties on the country whose implementation can contribute to minimize environmental impacts associated to floriculture.

4.3.5. Investment Law

The latest investment law of Ethiopia (Proclamation No. 769/2012), which applies to all investors irrespective of nationality, states, in its preamble, that the ultimate goal of investment is accelerating the economic development of the country and improving the living standards of its people. Article 5 declares the general objective of investment in Ethiopia- “to improve the living standard of the people of Ethiopia through the realization of sustainable economic and social development”. Unlike a development discourse that pays little attention to the environment and other

[28] The FDRE Constitution, Article 9(4)

social issues, the realization of sustainable economic and social development requires changing unsustainable patterns of production and consumption, and protecting natural resources. The same provision states specific objectives of investment as: accelerating economic development, exploiting and developing the natural resources of the country, developing the natural resources of the country, developing the domestic market, increasing foreign exchange earnings, encouraging balanced development, enhancing the role of the private sector in economic development and creating employment opportunity.

Unlike the general objective, the specific objectives capitalize economic growth without featuring the issue of sustainability. The same is true for the specific provisions of the Investment Proclamation. For instance, failure to carry out environmental impact assessment or comply with environmental standards is not stated as a condition to grant, renew, suspend or revoke an investment permits.[29] Apart from this, the Investment Regulation issued in 2012 states export performance, sectors and region where the investment takes place as considerable factors for incentives.[30] Yet environmental sustainability is not mentioned among the grounds for incentive whose inclusion would have been progressive from the perspective of environmental protection and sustainable development as envisaged in the Proclamation.

Article 38 of the Investment Proclamation reads "[a]ny investor shall have the obligation to observe the laws of the country in carrying out his investment activities. In particular, he shall give due regard to environmental protection". This provision gives direct reference to the environment, but the obligation is not formulated in a decisive language.[31] In other words, it failed to demand the investor to respect the environmental laws of the country unequivocally. The environmental laws of the country regulate the consequences if an investor fails to give due regard to environmental protection.

[29] See Investment Proclamation No. 769/2012 , part VI

[30] Investment Incentives and Investment Area Reserved for Domestic Investors Council of Ministers Regulation No. 270/2012.

[31] See Fikeremarkos Merso, Green Growth, Investment, Environment and Sustainable Development in Ethiopia, Country Report: Ethiopia, *IUCNAEL EJournal* (2014), Vol. 5, p. 163, www.iucnael.org , accessed on 22 March 16

4.4. Institutional Framework

In Ethiopia, the concern for environment and protection measures emerged gradually. The 19th century marks the beginning of modern governmental administrative system with cabinet of ministers in this oldest independent nation in Africa. In 1893, the Ministry of Agriculture was established with the power to assess and preserve natural resources, particularly forests and lands.[32] Following this governmental effort to protect natural resources, the first protected forest was established 30 km away from Addis Ababa. The endeavour that began with the protection of forest resource evolved, after a century, into a commitment to establish a focal environmental agency and a legal regime for the protection of the overall environment in the country. In 1994, the Environmental Protection Authority was established under the Ministry of Natural Resources Development and Environmental Protection.[33] Before this period, environmental issues were handled by sectoral ministries whose primary concern was allocation and exploitation of resources. New laws started to emerge in areas other than resource utilisation such as pollution control and environmental impact assessment.

In 2002, the Environment Protection Authority was re-established as an independent institution by proclamation No. 295/ 2002. The proclamation vested the authority with the power to initiate policy and legal framework, and ensure compliance with environmental laws and standards. In 2013 the Authority was upgraded to a Ministry and named the Ministry of Environment and Forests. With this transformation the government has shown willingness to give more attention to environmental protection.[34]

Currently, under new administrative arrangement, the main responsibility to protect the environment rests on the Ministry of Environment, Forest and Climate

[32] Hailu, *supra* note 3, p. 28
[33] After few years, the Authority was re-established an independent institution by proclamation No. 296/ 2002.
[34] Merso Birhanu, *supra* note 31, p. 163.

Change (MoEFC). This Federal Institution has the following main duties, among others;[35]

- Coordinate activities to ensure the realization of the environmental objectives provided under the Constitution and the basic principles set out in the Environment Policy of the country;
- Establish a system and follow up for undertaking environmental impact assessment on investment projects to evaluate the impacts of their implementation on the environment;
- Coordinate actions on soliciting the resources required for building a climate resilient green economy in all sectors and at all Regional levels;
- Formulate or initiate the formulation of policies, strategies, laws, guidelines and programs to implement international environmental agreements;
- Prepare or cause the preparation of environmental cost benefit analysis; and
- Propose incentives or disincentives to discourage practices that may hamper the sustainable use of natural resources.

Following the Federal arrangement of the country, in Regions, there are institutions with environmental protection tasks, but their role is more of focused on implementation of environmental policies, programs and projects streamed down from Federal Institutions. As the Constitution proclaims, environmental laws are enacted and policies are issued at the Federal level to be implemented at regional and lower administrative levels by respective Institutions. Proclamation No. 295/2002 also required each Regional State to establish an independent regional agency responsible for coordinating the formulation, implementation, review and revision of regional conservation strategies (1); and environmental monitoring,

[35] Definition of Powers and Duties of the Executive Organs of the Federal Democratic Republic of Ethiopia Proclamation No. 12/2015

protection and regulation (2).[36] However, in some regions such independent institutions are not established.

Issues of institutional arrangement are addressed in Section 5.1 of the Environmental Policy of Ethiopia. The main policy issues include:

- The need to ensure institutional arrangement that extends to community level and the existence of legally established coordination among institutions;
- The need to engage all stakeholders- government organs, NGOs, professional associations, community representatives and business entities at all levels for effective environmental governance;
- The need to assign responsibilities of environmental and natural resource development and management activities, on the one hand, and environmental protection, regulation and monitoring, on the other, with distinct institutions in order to avoid conflict of interests.

Federal form of arrangement is believed to give more opportunity for various actors at different level to engage in environmental protection. Nevertheless, this advantage is not exploited in Ethiopia for effective and collaborative implementation of environmental regulation due to absence of well-established functional linkages between the Federal Institution and Regional Environmental Agencies. Apart from this, environmental protection organs are not established at the lower levels of administrative structures of the countries in most Regional States.[37] They have not been provided with sufficient human, financial and technical capacities to enforce laws and regulate environmental impacts. As a result, there is less effective, coordinated and collaborated environmental management system in Ethiopia.[38]

[36] Environment Protection Organs Establishment Proclamation No. 296/2002, Article 15(1).
[37] Damtie & Kebede, *supra* note 20.
[38] *Ibid*.

Not only the need to establish institutions to the lowest levels of administrative structure, but also the involvement of non-state actors in environment regulation is required in environmental governance system. Yet explicit recognition to the roles and contributions of non-state actors in the environmental governance system is absent in the proclamations issued subsequent to the policy document. The only exception to this can be Article 8 (d), (e) and (f) which lists representatives of the Ethiopian Chamber of Commerce, local environmental NGOs and Confederation of Ethiopian Trade Unions as members of the Environmental Council. The main responsibility of the Council relates to reviewing proposed environmental policies, strategies and laws of the country.[39] Nevertheless, key stakeholders are not comprehensively represented in the Council and the later have limited role in observing and enforcing environmental rights and obligations of citizens.[40] Thus, environmental protection tasks are carried out mainly by government institutions.

The responsibility to manage natural resources is assigned to various Federal and Regional Government Institutions. For example, the Ministry of Water, Irrigation and Electricity undertakes the management of water and energy resources. Institute of Biodiversity Conservation is responsible for the management, conservation and research of the flora, fauna, and genetic resources of Ethiopia. Ethiopian Wildlife Conservation Authority is in charge of conserving and managing the country's wildlife and habitats. Co-ordination among these institutions is required for effective environmental protection. Further investigation is required to show how well the institutions function to effectively implement environmental laws and policies. This is an area reserved for future research; only a brief consideration of the issue is provided here because of the limitations of the thesis.

4.5. A Climate-Resilient Green Economy

Ethiopia has been experiencing the effects of climate change such as increase in temperature and change in rainfall patterns. Recognising this and with the view to eliminate the adverse impacts of climate change, the country introduced a Climate-Resilient Green Economy Strategy in 2011. The country aims to build a green

[39] Proclamation 265/2002, Article 9
[40] Damtie & Kebede, *supra* note 20, p. 44

economy that helps to achieve middle-income status by 2025 through identifying green economy opportunities and keeping greenhouse gas emissions low.[41] As set forth in the Growth and Transformation Plan, to attain this goal, the country needs to boost agricultural productivity, strengthen the industry sector and foster export growth. Nevertheless, as stated in the Strategy document, following a conventional development path can result in a sharp increase of greenhouse gas emission, estimated to reach more than double to 400 Mt CO2e in 2030. [42] The plan is to reduce this emission by 64% though Ethiopia's contribution to global GHG emission is very low (less than 0.3 %). The country will adopt a green growth path that fosters development and sustainability. About 60 initiatives have been identified which could help the country achieve its development goals while limiting GHG emissions. One strategy to achieve the goal as envisaged by the government is to sell carbon credits. The key components of the Climate Resilient Green Economy Strategy occupy major place in Ethiopia's Climate Action Plan to the UN Framework Convention on Climate Change submitted ahead of the 2015 Paris Conference.[43] The country is among 175 countries to sign the Paris climate deal that pledges to reduce greenhouse gas emissions bellow a rise of 2 degrees Celsius.

The green economy plan is based on four pillars:

- Improving crop and livestock production practices for higher food security and farmer income while reducing emissions;
- Protecting and re-establishing forests for their economic and ecosystem services;
- Expanding electricity generation from renewable resources of energy for domestic and regional markers; and

[41] FDRE, Ethiopia's Climate-Resilient Green Economy Green economy strategy, 2011, Addis Ababa, http://www.undp.org/content/dam/ethiopia/docs/Ethiopia%20CRGE.pdf , March 23, 2016

[42] More than 85% of GHG emissions came from the agricultural and forestry sectors. Crops cultivation contributes to the concentration of greenhouse gases mainly from the use of fertiliser (~10 Mt CO2e) as well as by the emission of N2O from crop residues reintroduced into the ground (~3 Mt CO2e). *Ibid*.

[43] Intended Nationally Determined Contribution (INDC) of the Federal Democratic Republic of Ethiopia, available at www.unfccc.int , accessed on 30 March 16

- Leapfrogging to modern and energy-efficient technologies in transport, industrial sectors and building.

With regard to agriculture, the Strategy aims to limit soil-based emission and minimise pressure on forests from the expansion of land by taking measures that include improving crop and livestock practices, reducing deforestation through agriculture intensification and irrigation of degraded land, and introducing lower-emission agriculture techniques. All these measures can only be implemented into practice where there is strong system of environmental governance that effectively enforces legislation. One of the key strategies in building a 'green economy' is thus strengthening the capacity to implement environmental laws. Further, hastened economic growth to attain middle-income country status (by 2025) might increase pressure on some resources, such as water, and increase emission of some pollutants. To achieve this vision, the country needs to have a strong institutional capacity to mainstream environmental issues and enforce legislation.

Conclusions

It is clear that overall existing environmental policies and laws of Ethiopia indicates that sustainable development is widely promoted and the need to ensure interests of the future generation is highlighted. This is, at least, the theory. The Ethiopian Constitution, particularly, guarantees the right to improved living standards and to sustainable development. The laws and the policy document demand the protection of the environment against destruction during design and implementation of development programmes and projects. An environmental protection system that requires major development projects to go environmental impact assessment before project implementation is also established by proclamation. However, further investigation is required to assess the effectiveness of the system, especially after delegation of power to review EIA study for sectoral institutions.

Since 2011 Ethiopia is committed to build a "Climate Change Resilient Green Economy", progressive from the perspective of sustainable development and environmental protection. The achievement of this and sustainable development

require effective environmental governance within which different stakeholders take part in environmental protection. Acknowledging this, the Environmental policy of Ethiopia underlines on the need to engage all stakeholders- government organs, NGOs, professional associations, community representatives and business entities at all levels for effective environmental governance. Nevertheless, environmental proclamations issued subsequent to the policy document failed to provide legal basis for stakeholders' participation in Environmental protection tasks. Accordingly, the responsibility to regulate and conserve the environment mainly rests on government institutions which are ineffective due to limited capabilities. The form of regulation is a sort of 'command and Control'. Legislation are drafted with the objective of forcing regulated entities to take specific actions, internalise environmental damages or achieve desired outcomes backed by such mechanisms as monitoring and sanctions. As indicated in Chapter Three, this kind of regulatory approach is often ineffective- costly or too rigid or inflexible to deal with complex and dynamic problems. Though a mixture of enforcement strategies (market-based mechanisms, engagement with industry associations, NGOs and local communities and/or incentives) are encouraged to safeguard the environment against harms caused by economic activities, these are not well recognized in the Ethiopian environmental regime. Besides, as discussed in subsequent chapters, the system of environmental regulation is poorly resourced.

There is weak relationship between Federal and Regional environmental protection agencies. As a result, the standards established in the laws and regulations may not be effectively implemented as required. The chapter discussed about existing institutional arrangements to implement environmental laws. Further investigation is, however, required to show how well the institutions function; only a brief consideration of the issue is provided because of the limitations of the thesis. The upcoming chapters illustrate some of the limitations of government institutions to effectively enforce legislations.

Regulation No. 207/2011, especially designed to promote implementation of good agricultural practices in the floriculture sector, reaffirms companies' obligations to observe environmental and labour standards established in other legislation. It

uniquely encourages companies to take initiatives that go beyond the minimum legal requirement and engage in good agricultural practices. The system of certification invites companies to take part in the effort to achieve environmental sustainability within the sector. The requirements provide flexibility so that companies introduce agricultural practices suiting their situations. Chapter Eight investigates the effectiveness of these and other certification systems related to the floriculture industry. In parallel with this self-regulatory approach, it is important if the government considers the introduction of market-based mechanisms as enforcement strategies to deal with the changing face of the sector. We turn to the regulation of pesticides and waste, particularly relevant to the Ethiopian flower industry.

Chapter Five: The Regulation of Pesticides and Waste

Introduction

As outlined in chapter two, the floriculture industry is known to use a wide range of pesticides to protect crops against pathogens that can deteriorate the quality of flowers demanded by the market. Pesticides are among major inputs in quality flower production, however; they can potentially bring devastating impacts on human health and the environment. States introduce a system of regulation that enables them identify the nature of the chemicals as well as associated risks with their use and application. They particularly regulate the formulation, production, use, transportation and disposal of pesticides. This chapter discusses about these issues in the Ethiopian context. It identifies major problems in the regulatory system and addresses the issue of obsolete pesticides that the country has been confronting with for years. It points out how flow of investment into the floriculture sector and the aspired development benefits have been confronting with the overall policy to regulate pesticides. Demarcating the root causes of environmental problems (water pollution, loss of aquatic life and soil pollution) discussed in subsequent chapters, this chapter is an important part of the thesis, because, in one way or another, the problems emanate from the hazardous nature of pesticides applied during flower production and/or failures to effectively regulate their importation and use.

The management of hazardous waste is the other major issue discussed in this chapter. It is now well established that the discharge of hazardous or toxic substance and waste into the environment can cause irreversible harm to living resources or ecological processes.[1] States regulate activities or products considered to be hazardous or dangerous to human health and the environment.[2] In relation to this, the chapter discusses the legislative framework in Ethiopia that addresses the problem of waste management. The chapter analyses the texts of the legislation to examine their applicability and effectiveness to regulate

[1] Alexandre Kiss and Dinah Shelton (2007), *Guide to International Environmental Law*, Martinus Nijhoff Publishing: Leiden, p. 21
[2] *Ibid.*

environmental impacts associated with flower cultivation. The chapter also identifies and discusses the main international regulations which address activities related to production, use, proper storage and handling, trade, transportation and elimination of pesticides and hazardous substances.[3] Before indulging into the discussion of national and international regulation of pesticides and wastes, however; the chapter provides general overview on pesticide use and waste management issues in the Ethiopian floriculture industry.

5.1. Pesticides Used in the Ethiopian Floriculture Industry

In Ethiopia, as investment started to flow into the floriculture sector, there were only few registered pesticides. It was not generally possible to satisfy the growing demand for pesticides by floricultural companies. The government took immediate measure to allow the import of pesticides with lenient requirements. Using this opportunity, floriculture companies managed to import a number of pesticides with various purposes. Yet some of these chemicals were found on World Health Organization (WHO) negative pesticide list, while others categorised as having carcinogenic potential (these can potentially cause cancer). It was reported that some hazardous chemicals like flucythrinate, chlorothalonil, cypro-conolone, folpet and mancozeb were used for flower cultivation.[4] Concerns about the types and amount of pesticides used, and the manner of their usage as well as disposal began to be voiced as the industry started to flourish.[5] Continuous discussions were held, with the initiatives of NGOS, to encourage the industry adopt socially and ecologically responsible policies and practices.[6]

[3] Ethiopia ratified the Rotterdam Convention in July 2002 through Proclamation No.278/2002; the Basel Convention in April 2000 by Proclamation No 192/2000; and the Stockholm the convention in May 22, 2002 through Proclamation No.279/2002.

[4] Tadesse Amera and Niggussu Aklilu (2008), Ethiopian NGOs work to improve conditions for flower producers, December 2008, Pesticide News 82, http://www.pan-uk.org , accessed on 14 August 2015; "Can the Flower Code Solve Ethiopia's Flower Farms and Employees?", Addis Fortune, Local News paper , September 19, 2007, http://friendsofethiopia.blogspot.com/2007/09/can-flower-code-solve-ethiopias-flower.html , accessed on 30 July 2015

[5] *Ibid*.

[6] Amera and Aklilu, *Supra* note 4.

Currently, there are no exact figures to numerically represent pesticides used in the Ethiopian floriculture industry.[7] Information from scattered literatures suggests that numerous pesticides with different chemical compounds are used in the industry. According to a report more than 212 types of pesticides with different active ingredients are used.[8] However, the number can exceed this figure as new products are imported every time by companies for 'individual farm use' under lax special arrangement, without following the legally established registration system of pesticides.[9]

Reports indicated that pesticides with hazardous nature are used for flower production. Water samples collected from wastewater discharge to Lake Ziway from floriculture companies were analysed by an accredited laboratory for residue in 2010, and results indicated that effluent water draining to the lake contained 20 pesticides with concentration of 0.1 µg/l or higher. [10] Among these pesticides, five are classified as high risk pesticides while four are moderate toxic compounds.[11] The concentrations of the pesticides were found above the thresholds, having ecotoxicological effects on water organism. In 2012, organophosphate and carbamate pesticides were found in pesticide stores of farms visited by Hanssen et al.[12] The former are toxic pesticides that can cause dizziness, vomiting, seizures,

[7] Jansen and Harmsen indicate that 'complete and reliable information' on pesticide is not available yet. H.C. Jansen and J. Harmsen (2011), *Pesticide monitoring in the Central Rift Valley 2009-2010, Ecosystems for Water in Ethiopia, Land Use Planning Program for the Central Rift Valley of Ethiopia*, Alterra-report 2083, Wageningen UR: Wageningen, p. 15

[8] Abiy Sahle and Jose Potting, 'Environmental Life Cycle Assessment of Ethiopian Rose Cultivation', *Science of the Total Environment* (2013), Vol. 443, p. 167

[9] See Section 5.3.1.3 bellow

[10] These include: bitertanol, boscalid, bupirimate, carbendazim, clofentezine, dodemorf, ethirimol, fenarimol, fenitrothion, imidacloprid, iprovalicarb, metalaxyl, methoxyfenozide, propamocarb, pyraclostrobin, tetradifon, triadimefol, triadimefon, trifloxystrobin and triforine. Jansen and Harmsen, *supra* note 7.

[11] Fenitrothion (0.16 µg/l), iprovalicarb (0.01-0.38 µg/l), methomyl (0.26-2.7 µg/l), triadimefon (0.16 µg/l) and triforine (0.1-0.4 µg/l) are classified as high risk pesticides while imidacloprid (0.04-0.3 µg/l), metalaxyl (0.18 0.51 µg/l), spiroxamine (1.1-4 µg/l) and triadimefol (0.1 µg/l) are moderate toxic compounds. *Ibid*.

[12] Vegard M. Hanssen, et al, 'High Prevalence of Respiratory and Dermal Symptoms Among Ethiopian Flower Farm Workers', *Archives of Environmental & Occupational Health* (2015), Vol. 70, No. 4, pp. 204-213

paralysis, loss of mental function and death.[13] Almost half of all the WHO class Ia and Ib pesticides are organophosphates. Carbamates also have toxicological effects caused by inhibition of neuronal acetylcholinesterase activity.[14] WHO class II (moderately hazardous) constituted a large proportion of the pesticide repository on all farms. As floriculture is a young industry in Ethiopia, environment impacts resulting from excessive application of hazardous pesticides is yet noticeable. Nevertheless, the continuous use of pesticides is believed to bring inevitable aquatic toxicity to terrestrial and freshwater resources.[15]

Environmental risks are directly related to the amount of pesticide applied for specific purpose. Thus, even if the nature of pesticides is less hazardous, repeated application with excess amount can have detrimental impact on the soil and water sources. In their study about environmental impact of Ethiopian rose cultivation, Sahle and Potting (2013) estimate that approximately 1.5 gm of pesticides is consumed to produce a bunch of roses (10-20 rose stems) while 0.6 grams of pesticide are emitted into the air. [16]

In April 2015, the Ethiopian Ministry of Forestry and Environment surveyed 21 farms from five floriculture corridors (Sebeta, Hollota, Sundafa, Ziway and Debre Zeit) to assess regulatory compliance levels in the industry.[17] The findings of the survey suggest that more than 50% of the farms failed to put in place material safety data sheet that describes the necessary safety measures about pesticides in chemical storage facilities. This contradicts with the findings of a study conducted

[13] FAO, *Prevention and Disposal of Obsolete Pesticides*, http://www.fao.org/agriculture/crops/obsolete-pesticides/what-dealing/obs-pes/en/ , accessed on 22 September 2015

[14] FAO, *Pesticide residues in food 2008 Joint FAO/WHO Meeting on Pesticide Residues* (2009), Report of the Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group on Pesticide Residues Rome, Italy, 9–18 September 2008, http://www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/JMPR/JMPRReport08.pdf , accessed on 22 September 2015

[15] Sahle and Potting, *Supra* note 8, p. 169

[16] This calculation was based on the estimate by Van den Berg et al. (1999) who indicated that 30-50% of total pesticides sprayed are emitted into the air due to spray drift and volatilization. Taking crop type and growing method into consideration, Sahle and Potting adopted 40% to calculate the emission level in Ethiopian rose cultivation. *Ibid*., p. 168

[17] The Ministry of Forest and Environment (2015), *Beabeba Ershawoch Lay Yetederege Tinat* (Written in Amharic, unpublished), Addis Ababa Ethiopia

by Ministry of Agriculture in 2010.[18] The study indicated that in the majorities of visited farms, safety signs and precautionary procedures are properly stated or affixed in pesticides stores. Both studies, however, indicated that many floricultural farms store pesticides in poor conditions without labels and/or labelled with only in English or some other language. Apart from these, some farms failed to provide their employees with sufficient personal protective equipment and adequate instruction about chemical application as well as safety measures. Farm managers complain that quality personal protective equipment is not easily available on the market and is not exempted from customs duty unlike pesticides and fertilizers.[19]

5.2. Waste Disposal Issues in the Ethiopian Floriculture Industry

Waste disposal is a major problem in the production of flowers in Ethiopia.[20] There are two kinds of wastes generated from the floriculture Industry: solid wastes and liquid wastes. Solid wastes include pesticide containers, chemical pesticide packaging, polythene greenhouse films and other plastic materials. The common waste management practice for wastes with this nature are: rinsing and puncturing of packaging materials; temporary storage; and burning and/or burying in a pit on a desolate part of the farm.[21] Burying pesticide containers, even if sealed, is not a sustainable way of disposal as it only delays soil and ground water contaminations. Alternatively, empty pesticide containers are burnt on the farm in an on-farm made incinerator barrel.[22] Even in this process, Polycyclic Aromatic Hydrocarbon (PAH), which has human toxicity effects, can be emitted.[23] A survey conducted in

[18] The Ministry of Agriculture (2010), *Yeabeba Ershawoch Beakakabi Lay Yalachew Tetsino*, (Written in Amharic, Unpublished), Addis Ababa, Ethiopia.
[19] *Ibid*., p. 14
[20] DLV Plant (2011), *Handbook for Greenhouse Rose Production in Ethiopia*, p. 97, http://www.dlvplant.nl/nl/core/media/file/Handbook_Rose_Ethiopia(1).pdf , accessed on 6 August 2015.
[21] *Ibid*.
[22] Sahle and Potting, *supra* note 8, p. 167; The Ministry of Agriculture, *supra* note 18
[23] Sahle and Potting, *supra* note 8, p. 169

Debrezeit (one of the major floriculture production area) suggests that almost 90% of farms in the area incinerate solid waste at high temperature.[24]

The most common greenhouse type in Ethiopia is a basic greenhouse with steel construction, covered with plastic film (mostly polythene), with fixed or adjustable single roof vents and fixed or adjustable side screens.[25] A plastic film covered greenhouse is relatively cheap requiring simple and light structures, but it needs to be replaced regularly presenting disposal issue for the floriculture industry. The study conducted by Sahle and Potting indicated that approximately 31 g of greenhouse plastic was consumed to produce a bunch of roses. Depending on the type of plastic used and employed management practices, the plastic film has an average life span of 3 years.[26] After use, the plastic is sold for other users, but the study did not indicate how it is finally disposed as waste.

Green waste includes remaining from plants, foliage and stems are mainly dumped or burned on open air. Asnake, in his study on the Potential of Floriculture Residue for Biogas Production, indicated that 28,032 tonnes of organic waste is generated per year from the total cultivated area of 554.3 ha and this is estimated to reach 45,514 tonnes if the cultivated area is 900 ha.[27] In 2008, Sher Ethiopia alone used to generate 75,000 kg solid waste per day and this waste was transported to dumping site which is 5 km away from the farm. In Debrezeit area, only 40% of the farms decompose these wastes into organic fertilizers.[28]

Liquid wastes are mainly effluent, wastewater from flushing drip line or cleaning spraying equipment. The way pesticide residues from spraying equipment or containers are handled can have impact on the environment. In most cases, wastewater is disposed in ditches or designated area while in other cases directly

[24] Abayneh Tilahun (2013), *Environmental Impacts of Floriculture Industry in Debrezeit Town: A Need for Strategic Environmental Assessment*, MSC Thesis, Environmental Planning and Landscape Design, Graduate Study in Environmental planning and Landscape Design, Faculty of Technology, Addis Ababa University, Ethiopia
[25] DLV Plant, *supra* note 20, p. 41
[26] Sahle and Potting, *supra* note 8, p. 166
[27] Tamrat Asnake (2008), *Potential of Floriculture Residue for Biogas Production*, MSC Thesis, Environmental Science Program, Addis Ababa University, Ethiopia, pp. 32-33
[28] Tilahun, supra note 24.

discharged to water bodies.[29] A study conducted to assess ecological impacts of floricultural companies established in Debrezeit found out that 30% of the farms established in the area discharge wastewater directly to water bodies while 40% drain to the land. [30] The practice of cleaning tank among some Ethiopian flower farms is described as diluting leftover pesticides and disposing of into a soak away pit, which is constructed from charcoal, sand and gravel.[31] This method, replaced every two years, is believed to filter out active ingredients and prevent pesticide leaching into deeper soil and groundwater sources. However, this way of liquid waste disposal is not sustainable as chemical residues and toxic substances can easily enter the environment.[32] Though the impact on the soil (including on living organisms) might depend on a number of factors, such as the nature of pesticide applied, rate of application, and soil condition, pesticide liking into the soil is inevitable which was estimated to be 0.1 gm per bunch of roses.[33]

Hany and Wondemneh, Monitoring and Control Experts at Ministry of Environment and Forestry, confirm that most surveyed flower farms constructed soak away peat.[34] They, however, note that though this may help to retain solid materials, it is not ideal solution to prevent contamination of the soil and ground water from chemicals residues. They believe constructed wetland treatment is better advantageous to naturally filter chemical compounds from liquid wastes before reuse or discharge into water bodies. Few farms took the initiative to introduce this treatment method but this is not satisfactory compared to the amount of waste discharged from greenhouses. In Debrezeit, for example, only 10% of flower farms established this vegetation buffer area while the remaining 90 % of the farms were not familiar with this wastewater treatment system.[35] The introduction and wide use of wastewater recycling and treatment, vegetation buffer preparation and

[29] DVL Plant, *supra* note 20, p. 97
[30] Tilahun, *supra* note 24
[31] Sahle and Potting, *supra* note 8, p. 167
[32] DVL Plant, *supra* note 20, p. 97
[33] Sahle and Potting, *supra* note 8
[34] Interview with Mrs. Hany Ezedin Mohammed, Monitoring and Control Expert, Ministry of Environment and Forestry and Mr. Wondimneh Abreham, Monitoring and Control Expert, Ministry of Environment and Forestry, 19 August 2015
[35] Tilahun, *supra* note 24

integrated pest management practices was suggested to minimize environmental impacts.

5.3. National Regulatory Frameworks

5.3.1. The Regulation of Pesticides through Registration

Global and national concerns about pesticide related risks on the environment and human health presses countries to strengthen regulatory control on pesticide import, distribution and use.[36] At the national level, countries formulate legislation to govern the registration of pesticides. This refers to a process within which pesticides are approved for sale or use after they are evaluated by responsible government authorities about their effectiveness for the intended purpose and the risks they might pose to human health or the environment. This screening mechanism helps to know about the chemical nature of pesticides; minimize adverse effects on humans and the environment; and identify those locally effective and with good quality. Regulatory authorities need to be authorized to require applicants for registration to submit the necessary scientific data and method of application or other aspects of use of the pesticide.

The primary responsibility of pesticides registration in Ethiopia rests on the Ministry of Agriculture (MoA) pursuant to the Pesticide Registration and Control Proclamation (No. 674/2010).[37] The Proclamation provides a wide definition for the term 'pesticide'. It is defined as any substance or mixture of substances or a living organism intended for preventing, destroying or controlling any pest including vectors of human or animal disease (a); unwanted species of plants or animals

[36] Belay T. Mengistie, et al, 'Information, motivation and resources: the missing elements in agricultural pesticide policy implementation in Ethiopia', *International Journal of Agricultural Sustainability* (2014)

[37] This Proclamation replaced the 1990 Pesticide Registration and Control Special Decree (No. 20/1990) that allowed only those pesticides considered to be less hazardous, safe, effective and good quality to be registered (Art. 5). The Decree incorporated provisions that govern a range of issues including the procedure of application for registration; requirements related to labelling and package; duration, renewal and cancellation of registration. It has been the governing law of pesticides registration until it was replaced by the Pesticide Registration and Control Proclamation in August 2010.Prior to the 1990 Decree, a single article regarding pesticide was included in Plant Quarantine Decree No. 56 of 1971. In this decree, MoA was given the mandate to control the import, production and sale of pesticide in the country. *Ibid*., pp. 5-6

causing harm during production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feed stuffs (b); or insects or pests on animal bodies (C) (Article 2(20). Not only chemical substances but also biological agents used in pest management fall under the realm of pesticides. Pesticides also include substances used to regulate the growth of plants or applied to protect crops against deterioration (Article 2 (20)).

One cannot formulate, manufacture, import, sell, store or use pesticides unless their registration is authorized by MoA (Article 3(1)). Pesticides will be registered if they are efficient, safe and good quality tested under field or laboratory conditions. Details about decisions on applications of registration and specific requirements for registration are provided under Article 5. One of these is the efficacy of the pesticide for the intended purpose and its suitability for local condition. Second, the pesticide should not be hazardous to human and animal health when applied in accordance with instruction. Since by their nature pesticides are toxic, designed to kill unwanted plants and organisms, they should be evaluated taking into account the directions of application. Third, the effect of the pesticide on the environment and non-targeted species should be insignificant compared to its benefits and the effect of other alternatives. The other consideration is that the residue of the pesticide should not be persistent or toxic when metabolized. This excludes pesticides with persistent organic pollutant substances from being registered. In addition, registration will be granted if the benefits outweigh the risks of use under local socio-economic conditions and the pesticide is not banned or severely restricted by an International Convention. When all conditions are satisfied, MoA will issue a registration certificate to the applicant that will remain valid for five years from the date of issuance (Article 5(3) & Article 6). The registration may also be renewed upon the expiry of its validity (Article 7).

Rules related to packaging, labelling, storage, transport and disposal of pesticides are provided in the Proclamation (Article 18). Pesticides should be packed in a container which is safe for storage, handling and use, and with a legible label in Amharic (Official language of Ethiopia) and English. In relation to disposal, the Proclamation states that pesticides or pesticide wastes should not be disposed in a

manner that may harm human or animal health or the environment (Article 21). Individuals that import or sell pesticides are made responsible for the disposal of obsolete pesticides at their custody at their expense.

MoA, with the objective to find out whether the provisions of the Proclamations are observed, may designate inspectors. Inspectors are authorized, without a warrant and upon presentation of identity card, to carry out inspections of establishments which import, export, manufacture, pack, label, store, distribute, sell or use pesticides (Article 30). They can take samples or seize any document, pesticide or other things related to pesticides. Moreover, they can close a pesticide storage facility or sales outlet if it is confirmed that the manner of the pesticide storage is not as required in the Proclamation. There are also penalty provisions in the proclamation that provides lists of actions that constitute offences in relation to use, sell, storage, labelling and disposal of pesticides (Article 33).

5.3.1.1. The Process of Pesticide Registration

Structurally, the office under the MoA responsible for pesticide registration and post-registration regulation is Animal and Plant Health Regulatory Directorate (APHRD). In-depth interview was held with personals of the Directorate with the objective to investigate the practice of pesticide registration, and to find out the major problems of the registration and pesticide regulatory systems. The following paragraphs summarize the procedures described during interviews held with informants at the Directorate.[38]

As a general principle anyone interested to import and distribute any kind of formerly unregistered pesticide must follow the registration procedure before the Directorate. Alongside with requirements for pesticide registration inscribed in the Pesticide Registration and Control Proclamation (No. 674/2010), a guideline prepared by the Ministry, which incorporates detail information that an applicant

[38] Interview with Miss Saba Debebe, Pesticide Registration and Control Expert, Plant Health Regulatory Directorate, Ministry of Agriculture, 13 July 2015; Interview with Mr. Alemayehu Woldeamanuel, Coordinator, Pesticide Reduction Program/Ethiopia, Ministry of Agriculture, 13 July 2015; Interview with Mr. Yismaeke Yitagesu, Seiner Chemist, Plant Health Regulatory Directorate, Ministry of Agriculture, 13 July 2015

should present about the pesticide intended for registration, governs the registration process. Accordingly, when an agent/importer approaches the directorate, he/she is required to fill application form and provide data about active ingredient and formulated product dossier index (chemical and physical property, toxicology, efficacy, residue and fate in the environment), authenticated copy of manufacturing licence in the country of origin and label in English and Amharic. The applicant is required to provide comprehensive scientific data demonstrating that the product is effective for the intended purpose under local condition (i.e. efficacy) and does not pose an unacceptable risk to human, animal health or to the environment.

Upon receipt, the application will be screened and, if complete, will be sent to pesticide registration technical team under APHRD for evaluation. Each team (at the time of interview constituting two experts) evaluates the document (i.e. the dossier index) based on four criteria: Physical and chemical property; Environmental risk; Human health risk and Efficacy. This is basically a process of risk analysis and screening of the pesticides applied for registration according to FAO and WHO pesticide classification lists. Pesticides listed under WHO 1a & 1b classification or banned under EU law will not be registered unless there is no substitute for the product. At the time of the interview, there was no mechanism to test the physical and chemical property of sample pesticides in laboratory due to absence of the facility in the Ministry. Efficacy tests are carried out by the Ethiopian Agricultural Research Institute and agricultural universities that send their reports and recommendations directly to the MOA. Before the whole pesticide enters the country, only samples are imported for efficacy trial.

The team also evaluate the proposed packaging method and whether the label is both in Amharic and English as well as clear for understanding. After evaluation, it recommends whether the product should be registered or not, and provides the reasons for its decision. The power to give final decision over registration rests on the director of APHRD. Finally, a pesticide registration certificate is issued to the applicant by pesticide registering officer. The applicant, then, obtains import licence and processes the importation of the pesticide.

When the pesticide arrives at customs duty point, inspectors are designated to carry out enquiry about the accuracy of the product. This is normally visual and inspectors, among other things, check the manufacturing date of the product. It is clearly stated in the Pesticide Registration and Control Proclamation that it is not allowed to import of pesticides manufactured before six months from the date of entry into the country unless MoA grants permit for importation for research or trial purposes or convinced that the stock can be fully utilized before the expiry date of the product (Article 17(3) (a) and Article 17 (4)). Inspectors also check label to confirm that the pesticides are those for which registration is granted. Previously, samples were randomly taken for laboratory test, but, currently, this is no more in practice due to absence of storage and laboratory facilities. Importers are simply instructed to keep samples by themselves so that they present the sample upon request.

5.3.1.2. Limitations of the Registration and Control System

The management of pesticides and thereby reducing the risks posed by their use are globally challenging. In developed countries, it appears that the use of pesticides decreased, but there are still some limitations to regulate and monitor risks arising from pesticides.[39] This can be explained, for example, with the presence of high (i.e. above regulatory acceptable concentration) agricultural pesticide concentration in EU surface water.[40] On the contrary, pesticide consumption is increasing in developing countries while there is poor pesticide management due to limited capabilities to regulate the use of pesticides.[41] Hond et al hold that "… the pesticide problem is far worse in [developing] countries, for example, because of lower levels of education, illiteracy, lack of functioning regulatory systems, lack of money for protective measures, and the availability of

[39] Pepijn Schreinemachers and Prasnee Tipraqsa, 'Agricultural pesticides and land use intensification in high, middle and low income countries', *Food Policy* (2012), Vol. 37, pp. 616–626; Sebastian Stehle and Ralf Schulz, 'Pesticide authorization in the EU—environment unprotected?', *Environmental Science and Pollution Research* (2015), pp. 1-16; T. Skevas, *et al*, "Designing the emerging EU pesticide policy: A literature review", NJAS - Wageningen Journal of Life Sciences (2013), Vol. 64– 65, pp. 95– 103

[40] Stehle and Schulz, *supra* note 39

[41] Schreinemachers and Tipraqsa, *supra* note 39

pesticide products forbidden in Western countries".[42] Accordingly, pesticides with hazardous nature are excessively used and poorly handled, resulting in environmental, health and economic problems.

The situation in Ethiopia is not also different. Pesticides, like DDT (obsolete and high risk pesticide), have been widely used in smallholder farmers improperly and sometimes for unintended purposes, causing serious health problems.[43] Pesticide residues have been found in food, drinking water and surface waters. A research conducted in three separate locations indicated that there is high risk of aquatic toxicity due to agricultural use of pesticides, such as chlorathalonil, deltamethrin, endosulfan and malathion.[44] With agriculture intensification and diversification that aim to meet national demands for food and increase in agriculture exports, there is increased demand for and use of agrochemicals. A good example is the rise in the demand for agrochemicals with the emergence of the floriculture sector in the country. As the use of pesticide increases, associated environmental and human health risks also escalate. Therefore, the problems within the registration system and the general regulatory framework need to be identified and tackled so that negative externalities will be minimized.

Early and recent reports indicate that there are a number of limitations with the Ethiopian pesticide registration system.[45] Some of these include: lack of adequate pesticide laboratory, limited personnel to evaluate applications, and low capacity to conduct efficacy trial (particularly for flower farms). The system created loophole for some companies to import pesticides without registration and import permit. It

[42] Frank den Hond *et al*, 'Questions Around the Persistence of the Pesticide Problem', in Frank den Hond *et al* (2003), *Pesticides: Problems, Improvements, Alternatives,* Oxford: Blackwell Publishing, p. 2.

[43] Jansen and Harmsen, supra note 7; Stephanie Williamson, 'Understanding the Full Costs of Pesticides: Experience from the Field, with a Focus on Africa' in Margarita Stoytcheva (Ed.) (2011), *Pesticides - The Impacts of Pesticides Exposure* (In Tech), pp. 25- 48, http://www.intechopen.com/books/pesticides-the-impacts-ofpesticides-exposure/understanding-the-full-costs-of-pesticides-experience-from-the-field-with-a-focus-onafrica, accessed on 30 April 2015

[44] Williamson, *supra* note 43

[45] See Tadesse Amera and Niggussu Aklilu (2008), Ethiopian NGOs work to improve conditions for flower producers, December 2008, Pesticide News 82, http://www.pan-uk.org , accessed on 14 August 2015; Tsehay Azage (2011), *Current Pesticide Registration System and Challenges in Ethiopia: Presented on Stakeholders Meeting on Pesticide Risk Reduction Activities in Ethiopia,* MOA, APHRD, Addis Ababa, October 26, 2011; Mengistie, *supra* note 36

was suggested that the pesticide management system needs to be improved in order to achieve high quality agricultural produce, and to protect public health as well as natural resources. The existence of these problems was confirmed during interview conducted with informants at APHRD.

The management of pesticide requires personnel with expertise and technical facilities. In view of this, consecutive programmes to strengthen the capacity of the pesticide registration system and national laboratories were initiated by the Ethiopian government. In 2006, APHRD collaborated with FAO and NGOs to introduce a strategy for pesticide use reduction and awareness building on misuse of pesticides. After two years, a programme on pesticide risk reduction was launched with a joint collaboration of APHRD, Alterra Wageningen-UR, the Swedish Chemical Agency (Keml) and FAO.[46] The objectives of the programme include: to develop a legal framework for the registration of pesticides; to develop a proper pesticide registration system and train local staff on dossier evaluation; and to develop a post registration system for pesticide residues, quality control, monitoring, inspection and pesticide storage. A Pesticide reduction programme with similar objectives has been implemented since 2010.[47] However, even after all these capacity building initiatives, the system is suffering from a number of problems mainly related to financial and human resources. Interviews at APHRD indicate that there are infrastructure and budget constraints that create obstacle for effective registration system. Mr. Alemayehu Woldeamanuel notes that trainings provided under Pesticide Reduction Program contributed for the improvement of the registration system.[48] As part of the program, it was possible to develop standards in relation to environmental and human health risks. Computer software that can assist the registration system through, for example, follow up of the dossier evaluation processes and risk analysis was introduced, but this is not used yet due to lack of adequate trained man power.

[46] Wagningen UR (2008), Reducing Risks of Pesticides in Ethiopia: Joint collaborative project on pesticide registration and post registration, http://edepot.wur.nl/188159, accessed on 14 September 2014

[47] Pesticide Risk Reduction Programme – Ethiopia (2013), Programme Overview and achievement, www.prrp-ethiopia.org , accessed on 14 September 2014

[48] Interview with Mr. Alemayehu Woldeamanuel, *supra* note 38.

Saba Debebe, pesticide registration and control expert at PAHRD, indicates that shortage of trained man power has been affecting the pesticide registration system.[49] She notes that though trainings were provided under Pesticide Risk Reduction Program, those participated in the training are assigned with other responsibilities. There is frequent organization restructuring in most government offices, including MoA that leads to relocation of employees. At the time of the interview only five personnel with general expertise are fully engaged in dossier evaluation. The experts can't evaluate the dossier in detail due to workload and limited expertise. A research also confirms the presence of limited numbers of experts at APHRD dealing with pesticide risk assessment, inspection and certification.[50]

Absence of laboratory facilities to test pesticide samples are also among major problems in the registration system. There is no mechanism to test the physical and chemical property of pesticides, leading the system to completely relay on the data provided by applicants (registrants). [51]

Mr. Woldeamanuel acknowledges the limitations in the registration system with regards to relaying completely on the information provided by applicants themselves.[52] He notes that there are possibilities of data misrepresentation; the available mechanisms to check the accuracy of the information are not adequate. The registration can be cancelled if the permit was provided based on false data and found to be environmentally hazardous. The conditions for suspension or cancellation of registration are provided under Article 11 of the Proclamation.[53] Nevertheless, this post registration measure can rarely be taken as post-registration

[49] Interview with Miss Saba Debebe, *supra* note 38.
[50] The research confirms that most experts have at least an MSc degree, but "their expertise is not evenly distributed along broad range of subjects that are relevant for dossier evaluation". Mengistie, et al, *supra* note 36, p. 12
[51] *Ibid*., p. 13
[52] Interview with Mr. Alemayehu Woldeamanuel, *supra* note 38
[53] The registration may be cancelled when it was secured in violation of the provisions of the proclamation; is found harmful to human health and the environment; is proven by research that it is no longer effective for its intended purpose; conditions attached to the registration has been violated; and MoA came across with new facts (Art. 11 and 12).

inspection is literally absent in the pesticide management system of the country. In other words, there is less possibility to find out about mischief.

The other major gap in the Ethiopian pesticide management system is absence of periodic post-registration monitoring of imported pesticides. This is an important procedure to regulate the use, transport and storage of pesticide after they are imported into the country. There are wide possibilities for pesticides to stay on shelf and sold after their date of use expired; the original label approved by the directorate be removed or replaced; and alteration of the packaging requirement and sale of pesticide in containers which are not safe and labelled. Despite all these risks, there is no full-fledged post-registration inspection system. There is no effective supervisory mechanism to regulate pesticides overuse and residue analysis at farmsteads. Mengistie, et al argue that

> monitoring and surveillance can help to identify pesticide pollution, spot dangers and provide useful information to refine risk assessment for registered pesticides…. So far, however, [these] are lacking and the regulatory body has no information regarding the products once they are registered. Besides, there is no Pesticide Stock Management System to monitor the distribution and use of imported pesticides.[54]

According to informants, there are financial, technical and human resource constraints to carry out these tasks.[55] In the absence of laboratory facilities, it is very difficult to identify unregistered, fake or bellow standard products at the hand of retailers, traders, transporters or farmers. Generally, the attention paid for post-registration inspection by the Ministry is weak.

In regional states, there are established bureaus, extending to local level, responsible for agricultural development and natural resource conservation. The responsibility to implement pesticide related regulations rests on these bureaus at

[54] Mengistie, et al, *supra* note 36, p. 14
[55] Interview with Miss Saba Debebe, *supra* note 38; Interview with Mr. Alemayehu Woldeamanuel, *supra* note 38; Interview with Mr. Yismaeke Yitagesu, *supra* note 38.

different levels. However, there are information gaps and limited technical knowledge among experts about pesticide legislations, pesticides available in the market and diagnosis of pathogens.[56] These are found to be one of the major barriers to regulate the pesticide distribution system and use in Ethiopia. Educational training that experts receive are said to be inadequate and mainly theory-based due to shortage of equipment, practical tasks, laboratories and tools.[57] Experts are not provided with in-service training and have little understanding about inspection. Mr. Yitagesu notes that the majority of pesticides imported to the country are sold in regions and there should have been strong inspection extending to local levels, but this is absent because of different reasons. One of these is information gaps between federal and regional inspectors. Districts, zones and regions are not provided with data on registered pesticides in Ethiopia and pesticides distributed and used at different levels are not recorded.[58] Similar kinds of information and knowledge gap were observed among pesticide retailers in Ethiopia leading to misguide and wrong advice on safe handling, storage and recommended doss. All these can possibly compromise efforts to minimize risks and achieve proper use of pesticides.

Not only lack of resources but also weak political will and absence of coherence between different policies, such as environmental, health, rural development, agriculture and trade, affect the regulation of pesticides.[59] For example, policies that are focused on agricultural intensification may presuppose the use of pesticides and fertilizers while these policies fail to address related health and environmental costs. In some cases, pesticides are misused while the import and provision of pesticides by governments and donors continue.[60] Apart from these, in many countries, "policy-makers are very reluctant to restrict the use of pesticides for fear of harming food production activities, harming export revenues, or increasing food prices".[61] These can be major contributory factors for the existence

[56] Mengistie, et al, *supra* note 36, pp. 8-9
[57] *Ibid*., p. 9
[58] *Ibid*., p. 14
[59] Williamson, *supra* note 43.
[60] *Ibid.,* p. 36
[61] Schreinemachers and Tipraqsa, *supra* note 39, p. 621

of major gap between pesticide policy on paper and its implementation in practice in Ethiopia.

It is indeed true that poverty alleviation is among top priorities in Ethiopia. Increased agricultural productivity and investment in labour intensive sectors, such as floriculture, is highly sought. The country is, thus, faced with having to produce more agricultural products profitably and sustainably while at the same time protecting human health and the environment from the side effects of pesticides. Balancing these two interests requires consecutive measures that enable to establish effective pesticide regulatory system. Side by side with comprehensive human and institutional capacity building initiatives, the country needs to bring political will and collaborate with private actors (such as companies and NGOS) to work towards strengthening the system. Apart from these, policies geared towards promoting integrated pest management and alternatives to chemical pesticides and creating awareness about pesticide use are important to minimize risks associated with pesticides.

As the formulation, production, transportation, use and disposal of pesticides are made subject to regulation, anxieties about impacts on the availability of the products on the market can arise.[62] Standards related to effectiveness and safety, for example, can lead to elimination of certain pesticides from the market and production cost increase. This was witnessed following the coming into effect of the European directive 91/414/EEC aimed to review active ingredients that have been approved for use as crop protection products in Europe.[63] Based on the requirements of the directive, more than half of crop protection products have been removed from the market since EC Pesticides Review Process began in 1995.[64]

[62] A. Leadbeater and U. Gisi, ' The Challenges of Chemical Control of Plant Diseases' in: U. Gisi, *et al* (eds.) (2010) *Recent Developments in Management of Plant Diseases,* Springer Science + Business Media B.V.; R.J. Hillocks, "Farming with fewer pesticides: EU pesticide review and resulting challenges for UK agriculture", *Crop Protection,* (2012), Vol. 31, pp. 85-93

[63] The Pesticide Authorisation Directive 91/414/EEC became effective in July 1993, with the main objectives to facilitate trade through harmonised regulation, to improve safety standards for consumers and operators and to decrease environmental contamination. This directive was replaced by Regulation No. 1107/2009, which is concerned with the placing of plant protection products on the market, and sustainable use of pesticides directive No. 2009/128/EC.

[64] Leadbeater and Gisi, *supra* note 62, p. 15.

Apart from this, complex legislation and regulation can leave farmers "uncertain of which chemicals they can use now, which may be withdrawn in the near future and most important of all, what are the alternative measures available to protect their crops".[65] Accordingly, when a country plans to make its pesticide regulatory system more stringent, it needs to be aware of the consequent effect on farmers and agricultural production and come up with creative solution to fill up the gap levied by the elimination of pesticides from the market. Integrating control by chemical pesticides with non-chemical control methods might help though these later methods are viewed as "less effective, less predictable and more expensive".[66]

5.3.1.3. Pesticide Registration and the Flower Industry

At the time when the Ethiopian flower industry started to flourish, there were limited list of registered pesticides that failed to satisfy the needs of the industry. The government, by considering the urgency in addressing pest problems, took immediate measures with two arrangements.[67] The first was an interim arrangement that authorized growers to import without restrictions unregistered pesticides to be used only on their own farms. Using this arrangement companies imported various types of pesticides in large quantity. Nevertheless, some of these were found on high hazard risk lists. [68]

The second was transitional arrangement. With the involvement of experts from Ethiopian Agriculture Research Institute, pesticides that were already imported and have been used by flower growers were surveyed. Following this, about 168 pesticides were listed and taken for granted as registered. Even though this was only temporary arrangement and it was believed that the import of any kind of pesticide will be according to the established registration system, floricultural companies continued importing pesticides by themselves for 'their own farm use' irrespective of the fact that the pesticides are registered with the directorate. When floricultural companies intend to import pesticides, they simply present

[65] Hillocks, *supra* note 62, p. 86
[66] Leadbeater and Gisi, *supra* note 62, p. 16
[67] Interview with Miss Saba Debebe, supra note 38.
[68] Amera and Aklilu (2008), *supra* note 4.

Material Safety Data Sheet which provides, among others, information about how the pesticide is going to be used, associated environmental and human health risks, and safety measures. The directorate simply approves the application by evaluating the accuracy of the information provided by applicants (flower growers). Unlike in the case of formal registration process, there is no requirement to go through efficacy test.

It was explained during interview that flower growers are only allowed to import pesticides with less hazardous nature.[69] However, with ever growing demand for pesticides with different nature and characteristics in the industry, which is sometimes beyond the knowledge and expertise of regulatory authorities, and lenient procedure to import pesticides, it is important to question how it is possible to ensure that the imported pesticides are safe for human health and the environment. The limitations in the regulatory system can create loophole for improper use of pesticides by floricultural companies. There is no mechanism to check whether companies actually use the pesticide they import on their own farm or transfer the chemicals to third parties.

During the interview with Hany Ezedin Mohammed and Wondimneh Abreham, monitoring and control experts at the Ministry of Environment and Forestry, it was indicated that they came across during field visits with obsolete pesticides identified and recorded by floricultural companies.[70] Though it may require in-depth investigation into the real cause of the problem, the presence of expired and banned pesticide products at the hands of flower farms can be an indication for the presence of weakness in the country's pesticide regulatory system. The following section discusses the problem of obsolete pesticides in Ethiopia, however; at this point it is important to mention that the Pesticide Control and Registration Proclamation requires any person who imports pesticides to dispose of obsolete pesticides in his custody at his own expense. The question still remains how far the

[69] Interview with Mr. Yismaeke Yitagesu, supra note 38.
[70] Interview with Hany Ezedin Mohammed, *supra* note 34; Interview with Wondimneh Abreham, *supra* note 34.

regulatory system is effective to find out the presence of the problem and enforce this obligation on companies.

5.3.1.4. The Issue of Obsolete Pesticides

The issue of obsolete pesticides has been a serious problem that most developing countries face in relation to pesticides. These are "stocked pesticides that can no longer be used for their intended purposes or any other purpose" and whose use is banned or severely restricted for health or environmental reasons, deteriorated as a result of improper or prolonged storage and not suitable for the intended use.[71] They include pesticides that are in all forms, empty and contaminated pesticides containers, heavily contaminated soil and buried pesticides.

In Ethiopia, obsolete pesticides started to accumulate since 1960s.[72] The main causes of the problem are attributed to prolonged storage of pesticides and inappropriate storage conditions because of poor infrastructural facilities, lack of trained man power, and weak pesticide registration and monitoring systems. Excessive and uncontrolled amount of pesticides progressively entered into the country through donation and by the Ethiopian government, especially to be used in state owned farms. While some of these pesticides were used for destined purposed, the rest have been accumulated in different parts of the country in poor conditions. Some pesticides were imported to control sporadic upsurge of seasonal pests which are caused due to inadequate monitoring and forecasting, but led to accumulation of large stocks of pesticides and deterioration as a result of prolonged storage.[73] In some cases, the amount of pesticides imported exceeded the required

[71] FAO (2001), *Obsolete, Unwanted and banned pesticides stocks*, 5th FAO Consultation meeting, Rome: FAO; May 10- 11, http://www.fao.org/fileadmin/user_upload/obsolete_pesticides/docs/consult_5_e.pdf , accessed on 21 September 2015

[72] Israel D. Haylamicheal and Mohamed A. Dalvie, 'Disposal of obsolete pesticides, the case of Ethiopia', *Environment International* (2009), Vol. 35, pp. 667–673

[73] Ibid., See also 'Obsolete pesticides- cleaning up the imminent threat', *The Ethiopian Herald,* Local News Paper, 14 May 2013, http://www.ethpress.gov.et/herald/index.php/herald/development/2554-obsolete-pesticides-cleaning-up-the-imminent-threat , accessed 14 September 2014; FAO (2001), Obsolete pesticides threaten communities in Ethiopia, 9 May 2001, http://www.fao.org/english/newsroom/highlights/2001/010503-e.htm , accessed on 13 October 2015

amount. Lack of awareness among importers and users about the potential dangers of unutilized and accumulated pesticides might have contributed to the problem.[74] Due to absence of well-established pesticide registration and monitoring system in the country, many pesticides donated and/or purchased were later on found to be poor in quality, improperly packed and labelled, and/or had already been banned for environmental or health reasons.[75] The problem was worse since there were leakages and contamination to natural resources resulting from poor storage facilities and poor management of acquired stocks.

The disposal of obsolete pesticides requires financial and technological capabilities, infrastructural facilities and trained personnel. Obviously, countries like Ethiopia, which are with less level of economic development, will be the ones that are more challenged with the problem. There are two choices for these countries, ether to export the pesticides for their disposal to countries with facilities or leave them in their state of conditions. However, both options have costs. If a country opts for export, it has to bear the necessary expenses for disposal or has to secure financial assistance from elsewhere, which may not be again an easy task. On the other hand, pesticides deposited in poor conditions are dangerous for human health and the environment.

Fortunate enough, Ethiopia was able to dispose obsolete pesticides by securing funds from international donors. In 2001, a project was launched for this purpose with the cooperation of the Food and Agriculture Organization of the United Nations (FAO), MoA and the Finnish hazardous waste management company Ekokem.[76] Over 1,500 tonne of pesticide waste material (from over 220 different stores all over the country) were collected, repackaged and shipped to Finland for disposal in 98 shipping containers. The stocks included organochlorines, organophosphates, carbamates, coumarines, inorganics, mixed pesticides and

[74] *Ibid.*
[75] Haylamicheal and Dalvie, *supra* note 72, p. 668
[76] Pasi Silvennoinen and Ekokem Oy Ab (2004), *Shipping obsolete pesticides from Ethiopia to Finland,* http://www.chem.unep.ch/pops/pcb_activities/PCB_proceeding/Presentations/Pasi%20Silvennoinen%20_Ekokem_%20longer%20written%20version.pdf , accessed on 5 August 2014

unknown pesticides.[77] The last shipping containers carrying pesticide wastes started their journey to Finland in July 2003 and the last kilograms of obsolete pesticides were finally disposed of in December 2003. In addition, from 2000 to 2008, Ethiopia managed to dispose 2600 tonnes of obsolete pesticides collected from more than 950 sites with two successive projects.[78]

The country also benefited from the support of African Stockpiles Programme (from July 2007 to 31st December 2011 and extended to 31st May 2013) and obtained US$ 2.62 million from global environment facility through the World Bank.[79] The objective of the programme was to assist the government of Ethiopia to dispose and/or safeguard the inventoried publicly-held obsolete pesticide stockpiles and associated wastes, and to help reduce the future accumulation of new stocks of obsolete pesticides. With this project, 450 tonne of obsolete pesticide from 53 sites were collected and shipped to Sweden and France for environmentally safe disposal.[80]

A number of policy initiatives have been developed and implemented to prevent future accumulation of pesticides in the country. As noted above, the government responded to the problem by introducing new pesticides control and registration proclamation that aims to create strong pesticide registration system. Alongside with this, capacity building and awareness raising measures were taken with the view to reduce the accumulation of pesticides. Yet, there are claims about the existence of obsolete pesticides, large quantities of contaminated containers, and pesticide application equipment stored in poor conditions at different parts of the country.[81]

A question was directed to PAHRD at the Ministry of Agriculture to find out whether the problem of obsolete pesticides is fully addressed in Ethiopia. Mr. Alemayehu Woldeamanuel, Coordinator of Pesticide Reduction Program,

[77] Haylamicheal and Dalvie, *supra* note 72, p. 667
[78] 'Obsolete pesticides- cleaning up the imminent threat', *supra* note 73.
[79] *Ibid*.
[80] *Ibid*.
[81] Gedion Getahun (2014), *Environmental Issues: Problems and Solutions,* http://akababi.org/gedion.htm , accessed on 17 August 2014

responded that the problem still exists in the country.[82] He notes that disposing an obsolete pesticide is not a sustainable solution; rather, there should be a strategy to prevent the problem before it actualizes. Strengthening the pesticide registration system was part of the effort to solve the problem. However, due to weak pesticide registration and monitoring system, pesticides can still accumulate in the country. During the last few years, the demand for pesticide has been increasing in the agriculture, particularly in the floriculture, and health sectors and this is still expected to escalate. Due to lack of post-registration monitoring mechanisms and pesticide tracking system, pesticides are simply imported while the products are still on the market and can satisfy needs.[83] In other words, pesticides simply enter the country creating gap between demand and supply. Unless otherwise a pesticide imported into the country is used on time for the intended purpose, it will inevitably expire and becomes obsolete. So even if a huge amount is disposed, there are possibilities for other pesticides to accumulate.

Haylamicheal and Dalvie stress on the need to pay attention to a number of issues in order to prevent the accumulation of pesticides.[84] These include trainings for pesticide importers, distributors and retailers on pesticide management; trainings for pesticide storekeepers on store management and pesticide users on proper pesticide handling; public awareness rising about pesticides; and encouraging organic farming in different agricultural sectors such as coffee and floriculture.

5.3.2. The Regulation of Waste in Ethiopia

At the national level, the regulation of the whole waste cycle starting from the production of the waste, its handling, storing, transportation, treatment and final disposal is important. Detail requirements may be put in place on persons and entities that are engaged in these activities. Generators may be required to register their activities and produce report on waste generated. Permits may be required for entities that treat, store or dispose of hazardous wastes. Technology based and management standards can be set for the treatment and disposal of hazardous

[82] Interview with Ato Alemayehu Woldeamanuel, *supra* note 38.
[83] *Ibid*.
[84] Haylamicheal and Mohamed A. Dalvie, *supra* note 72, p. 672

wastes. These standards may incorporate requirements to ensure that the waste will not leach into soil and groundwater; and wastes are not stored or disposed together or in proximity to each other if they create chemical reactions.

Countries, like the UK, have introduced intricate waste-related legislative frameworks. These frameworks lay down a definition of waste; govern the licensing of waste management activities (which include keeping, treating or depositing); and incorporate economic instruments (such as landfill tax and producer responsibility) which encourage waste minimization and recycling.[85] There are also criminal sanctions to punish those unlawfully dispose wastes. At the EU level, there are directives on Hazardous Waste and directives that address methods of waste management (i.e., Waste Framework Directive 2008/98/EC; Directive 2008/1/EC on integrated pollution prevention and control, Incineration of waste (Council Directive 2000/76/EC); Directive on the Landfill of Waste (Council Directive 99/31/EC); Directive 2008/1/EC on integrated pollution prevention and control; Directive on Incineration of waste (Council Directive 2000/76/EC); Directive on the Landfill of Waste (Council Directive 99/31/EC)).Ethiopia has a proclamation (Solid Waste Management Proclamation No. 513/2007) which focuses on solid waste management.

5.3.2.1. Solid Waste Management in Ethiopia

The Solid Waste Management Proclamation provides a short definition for solid waste; responsibilities of urban administration in relation to solid waste management; and requirements for inter-regional movement of solid wastes. It provides standards for the production of glass containers, tin cans and plastic bags. The proclamation also incorporates few provisions on the management of household wastes, construction debris and demolition wastes. This section examines whether wastes from the floriculture industry can be regulated by this legislation.

[85] Stuart Bell and Donald McGillivray (2006), *Environmental Law.* New York: Oxford University Press, pp. 573-624

The regulation of waste management is not easy; the problem begins with how waste should be defined. In defining waste, there is a tendency to consider it as synonymous with actual pollution or harm. Waste becomes a real threat to the environment when it is mishandled or abandoned. The whole cycle of waste need to be managed before the problem actualizes. Also there are many 'grey areas'.[86] Some of these include whether things which can be reused but discarded should be classified as wastes; whether things that are not wanted by one person, but valued by another, can be taken as wastes; or whether a residue or a by-product from an industrial process which can be used as raw material should be classified as waste.

Proclamation No. 513/2007 defines solid waste as "anything that is neither liquid nor gas and is discarded as unwanted". Wastes with liquid or gas nature are excluded both from the definition and the scope of the proclamation. The proclamation simply provided a broad definition that leaves the above raised issues unsolved. For example, it is not clear whether a product which is 'unwanted' or 'discarded' by the holder but valued by another person can be taken as waste. The European Directive on Waste and Repealing Certain Directives (2008/98/ EC) defines Waste as "any substance or object which the holder discards or intends or required to discard".[87]

The Proclamation has only 19 provisions and most of them lack exhaustiveness. While it says few things about the management of solid municipal wastes, construction debris and demolition wastes, it is silent about agricultural wastes. Unfortunately, there is no separate Proclamation that regulates the later. Accordingly, the kind of solid wastes generated from flower production, such as organic wastes (plant remaining) and packaging materials, are literally left unregulated in Ethiopia. Though any activity that causes pollution to the environment is punishable by the Environmental Pollution Control Proclamation (No. 300/2002), detailed law that imposes obligation on waste generators and authorizes government authorities to take measures need to be introduced.

[86] *Ibid*., pp. 558-559.
[87] Directive 2008/98/EC, Article 3 (1).

The Proclamation requires administrative authorities to have waste management plans and promote investment on the provision of solid waste management services (Articles 4&5). There is only a provision in relation to waste management licensing which requires a person that intends to engage in the collection, transportation, use or disposal of solid waste to obtain a permit. Details, for example, about places of disposal and technological requirements are absent. Generally, in Ethiopia, the regulatory mechanisms that are available to address the problems of pollution caused by waste are inadequate. Policies and laws which seek to encourage waste minimization, recycling and recovery need to be introduced.

5.3.2.2. The Management of Hazardous Wastes

In Ethiopia, there is no law that separately regulates the management of hazardous wastes. The 2002 Environmental Pollution Control Proclamation (No. 300/2002) has some provisions on this issue. This Proclamation defines hazardous waste as "any unwanted material that is believed to be deleterious to human safety or health or the environment" (Article 1(9)). Article 3 of the Proclamation outlaws any polluting activity, including discharge of hazardous wastes. Any person engaged in activity which is likely to cause pollution or environmental hazard is required to install sound technology in order to avoid or reduce the generation of waste, and when feasible, apply methods for recycling of waste. This precautionary approach is backed by the polluters pay principle; the proclamation demands any person who caused pollution to clean up or pay the cost of cleaning up the polluted environment. Relevant federal and regional authorities are empowered to take measures which may include the closure or relocation of any enterprise whose activity poses risk to human health or to the environment.

According to Article 4 of the Proclamation, no one can generation, import, keep, store, transport, treat or dispose of waste and chemicals categorised as hazardous without permit. Persons engaged in these activities are required to take appropriate precaution to prevent any damage to the environment or to human health or well-being. Neither this proclamation nor other regulation provides specific requirements to be taken into account while granting permits to

individuals. Apart from this, persons engaged in the preparation, production, manufacturing or transportation of any hazardous or restricted chemical need to ensure that the chemical is registered, packed and labelled.

There should be an effective regulatory mechanism to monitor compliance with formulated standards and to regulate pollution. The Ministry of Environment, Forestry and Climate Change is authorized to assign inspectors that have the power to enter any land or premises at any time without notice or court order (Article 8). Various powers are vested on inspectors that include checking, copying or extracting any paper or document related to pollution; taking samples of any material; examining any commodity, process or facility; and seizing any equipment or object. Failure to be abide by the standards may lead to closure of the enterprise or/and criminal punishment (Articles 16 & 17). In addition, failure to manage a hazardous waste or another substance according to law; mislabelling or failure to label any hazardous waste or taking part or aiding in the illegal traffic of hazardous waste is punishable with imprisonment and fine (Article 15(2)). However, the monitoring and control experts at the Ministry explain that there are financial and human resource constraints to carry out inspection in any premise, including floricultural companies, both at the federal and state levels.[88] At the time of the interview, the number of inspectors at the Ministry was 12. Apart from these, there is lack of laboratory facilities to take samples and inspect the presence of pollutants in effluents. It is not possible to know, for example, whether a company is discharging effluents into water bodies after treatment or not. It is also difficult to know the source of pollution as in majority of cases there are a number of industries established adjust to water bodies. They indicate that without convincing and tangible evidence, it is not feasible to take legal measures against suspected pollution cases.[89]

[88] Interview with Hany Ezedin Mohammed, *supra* note 34; Interview with Wondimneh Abreham, *supra* note 34

[89] *Ibid*.

5.4. International Regulatory frameworks

5.4.1. The Regulation of Pesticides

Pesticides are often categorised under the subgroup of hazardous chemicals and their regulation usually falls under the general regulatory framework for chemicals. Nevertheless, pesticides are different from other kinds of chemicals as they are often highly toxic, produced and used in large quantities and widely applied over large area of land.[90] They are applied directly to the environment and over foodstuffs. Treaties and other international acts, which have as their objective the international regulation of chemicals, pesticides and other hazardous substances, address the issues of registration and classification; production and use; international trade; and transport.

5.4.1.1. The Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention on Persistent Organic Pollutants (adopted on May 22, 2001, entered into force on May 17, 2004) aims to protect human health and the environment from persistent organic pollutants (POPs). It imposes a global ban on a wide range of toxic and environmentally hazardous chemicals. By their nature POPs possess toxic substances, resist decay, accumulate in the fatty tissue of humans and wildlife, and are transported through air and water.[91] They have harmful impacts on human health or on the environment. Some health impacts include cancers, birth defects, dysfunctional immune and reproductive systems, and damages to the central and peripheral nervous systems.[92] As a global response to the problem, the Stockholm Convention requires its parties to take measures to reduce or eliminate releases from the production and use of certain POPs (Article 3). It urges POPs'

[90] Philippe Sands (2003), *Principles of International Environmental Law,* 2nd Ed., Cambridge: Cambridge University Press, pp. 625.

[91] P. L. Lallas, "The Stockholm Convention on Persistent Organic Pollutants", *AJIL* (2001), Vol. 95, p. 692; J.A. Mintz, "Two Cheers for Global POPs: A Summary and Assessment of the Stockholm Convention on Persistant Organic Pollutants" , *Georgetown International Environmental Law Review* (2001), Vol. 14, p. 319.

[92] http://chm.pops.int/TheConvention/Overview/tabid/3351/Default.aspx, official website of the Convention, last accessed August 24, 2014

manufacturers to provide information to users, governments and the public about hazardous properties of these chemicals.

The Convention initially targets twelve POPs.[93] Each party, through legal and administrative measures, is required to prohibit and eliminate the production and use as well as regulate the import and export of substances listed in Annex A (most of which are insecticides and polychlorinated biphenyls (PCBs)) (Article 3(1)). Annex B lists those chemicals that need to be restricted (specifically DDT). The import and export of chemicals listed in this Annex can take place under specific restrictive conditions, as set out in Article 3 (2). Each party also agreed to take measures concerning unintentional production of chemicals listed in Annex C (primarily PCBs and dioxins) (Article 5)). These measures include developing and implementing an Action Plan designed to identify, characterise and address their release using the best available techniques and environmental practices. The Convention also incorporates provisions concerning safe and an environmentally sound management of stockpiles and waste containing or contaminated with POPs (Art. 6). Wastes need to be handled, collected, transported and stored in an environmentally sound manner and disposed in such a way that the POPs' content is destroyed or irreversibly transformed. The Convention requires that such stockpiles and wastes be identified and managed to reduce or eliminate POPs release from these sources.

5.4.1.2. The Rotterdam Convention on PIC Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC Convention, adopted on Sept. 10 1998) was entered into force on 24 February 2004. The convention has the objective to promote shared responsibility and cooperation among parties that internationally trade in certain hazardous chemicals through

[93] These can be placed in three categories:
Pesticides: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene
Industrial Chemicals: hexachlorobenzene, polychlorinated biphenyls (PCBs)
By-Products: hexachlorobenzene, polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF), and PCBs.

facilitating information exchange about the characteristics of the chemicals (Article 1). It aims to protect human health and the environment and contribute to environmentally sound use of chemicals. The Convention applies to banned or severely restricted chemicals, and severely hazardous pesticide formulations (Article 3(1)). The former refers to a chemical that has been prohibited by regulation in order to protect human health or the environment (Article 2 (C)). Severely hazardous pesticide formulation is defined in the Convention as "a chemical formulated for pesticidal use that produces severe health or environmental effects observable within a short period of time after single or multiple exposure, under conditions of use" (Article 2(d)).

The Rotterdam Convention functions through the mechanisms of prior informed consent (PIC) procedure and information exchange. The PIC procedure is a mechanism for formally obtaining and disseminating the decisions of importing parties about their willingness to receive future shipment of chemicals listed in Annex III of the Convention (Articles 10 & 11). This Annex lists chemicals subject to PIC. Other chemical substances, including severely hazardous pesticide formulations that present a risk under conditions of use in developing countries or countries with economies in transition, may be proposed for inclusion in the Annex. Once a chemical is included in the Annex, information concerning the chemical and the regulatory decision to ban or severely restrict the chemical will be circulated to all parties. Parties give either final decision to allow or not to allow import of the chemical or they may give an interim response. They may also decide to allow the import of the chemicals subject to specified conditions. However, countries that decide not to consent to import of a chemical need also prohibit the import of the same chemicals from any source and domestic production of the chemicals for domestic use (Article 10(4)). The decisions about the import of chemicals need to be circulated among contracting parties. Exporting country parties are expected to ensure compliance with the decisions by exporters within their jurisdictions. Apart from this, the Convention requires each party to notify the Secretariat whenever a domestic regulatory action to ban or severely restrict a chemical is taken. It is a means to facilitate information exchange among parties.

Exporting states have a number of responsibilities in the Convention. Before proceeding with the export of chemicals listed in Annex III, they need to provide information about possible risks to human health or the environment, by taking into account relevant international standards, to importing states (Article 13(2)). Based on the provided information about chemicals and pesticides, importing countries can exclude those that are difficult for safe management. Also exporting states need to fulfil labelling requirements. The Convention promotes labelling requirements to ensure the provision of information about risks to human health or the environment. Impliedly, the Convention places the primary duty to provide information about chemicals and pesticide hazards on private actors (mainly manufacturers). Each party is required to implement appropriate legislative and administrative measures in relation to the import of chemicals listed in Annex III (Article 10(1)), and to ensure that the public has appropriate access to information on chemical handling and accident management to the chemicals (Article 14(1) (b)).

5.4.2. The Regulation of Solid and Hazardous Waste

It seems that the main corpus of waste management is reserved to be regulated within the domestic context. International environmental law plays part in the control of marine pollution and the regulation of transboundary movement of hazardous waste. The 1972 London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters is one of a kind that provides a global framework for the control of deliberate disposal of wastes and other matters at sea. International law has had impact on regulating transboundary movement of hazardous waste that became a common practice due to tighter waste regulation in some countries (mainly the US and Europe).

Toxic or dangerous substances are transported from one country to another in order to be eliminated, recycled or disposed. The producer of waste may prefer to dispose of it in another country when the regulations of the producing country make disposal at the point of precaution difficult.[94] In these cases, producers will likely target countries that have less strict regulation, ineffective compliance and

[94] Kiss and Shelton, *supra* note 1, p. 211.

monitoring capacity or are less concerned about the dangers they pose. Lower disposal cost is another deriving factor for a producer to export wastes.[95] This happens in situations when the costs of, for example, waste treatment plants are less costly in importing countries than those in the producing countries. Also, a multinational company might possess a foreign subsidiary specialized in the elimination of certain types of dangerous wastes.[96] The company will transport its wastes to the foreign subsidiary for treatment and disposal.

Principle 14 of the Rio Declaration declares that "states should effectively co-operate to discourage or prevent the relocation and transfer to other states of any activities and substances that cause severe environmental degradation or are found to be harmful to human health". In the 1980s, unilateral action in the form of national legislation began to be adopted to prohibit the importation into or transhipment through their territories of all foreign wastes. This recognition to the need to regulate an increasing movement of hazardous wastes across boundaries resulted in the adoption of an International Convention. At the end of the period, 116 states adopted the Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (Basel, Mar.22, 1989). The Convention, which was a "response to a public outcry" against the export and deposits of toxic wastes in Africa and other parts of the developing world, entered into force on 5 May 1992 (Basel Convention, Introduction). It establishes a global framework for controlling transboundary trade in hazardous waste and ensuring sound management of wastes that are exported and imported. It aims to reduce the generation of hazardous wastes and promotes environmentally sound management of waste. It is also among the objective of the Convention to restrict transboundary movement of hazardous wastes. It urges the introduction of a regulatory system to cases where transboundary movements are possible (Article 4(2) (a) and (d)).

The Convention defines waste as substances or objects that are disposed of or are intended to be disposed or are required to be disposed by the provisions of national law (Article 2(1)). It lists categories of wastes in different Annexes. Annex I

[95] *Ibid*., pp. 211-212.
[96] *Ibid*.

lists categories of wastes to be controlled such as chemical wastes from medical care facilities and wastes from pharmaceuticals. Annex II contains categories of wastes collected from households and residues arising from the incineration of household wastes. In Annex III hazardous wastes with characteristics of explosive, flammable, oxidizing, poisonous, infectious, corrosive, toxic and ecotoxic are listed. Liquid wastes generated from flower cultivation, normally contaminated with pesticides and other agrochemicals, are by nature poisonous or ecotoxic and can fall under Annex III. This Annex lists, among others, substances or wastes that can cause death or harm to human health if swallowed or inhaled or through skin contact. Plant leafs and disregarded flowers, the other kinds of wastes generated from the floriculture industry, are organic Peroxides (refer to organic substances or wastes which are thermally unstable substances and may undergo exothermic self-accelerating decomposition), again listed in the same Annex. Plastic wastes (in this case old greenhouse cover) are not found listed in the three Annexes. This is found in Annex IX which lists wastes not to be covered by Article 1, paragraph 1(a) of the Convention unless they contain Annex I material "to an extent causing them to exhibit an Annex III characteristic".

The Convention prohibits sending hazardous waste to another signatory state that bans importation of it (Article 4(1) (b)), or if the importing country does not have the facilities to dispose of the waste in an environmentally sound manner (Article 4(2) (b) (e) & (g)). Primarily, it advocates the treatment and disposal of hazardous waste to be as close as possible to its source of origin. It is stated in the preamble that "hazardous wastes and other wastes should, as far as is compatible with environmentally sound and efficient management, be disposed of in the state where they were generated". The Convention establishes a system whereby the exporter of waste must obtain, prior to shipment, the consent of authorities in the importing country for situations that require export of hazardous wastes (Article 4(1)(c) and Article 6). Such export will only be permitted under conditions which cannot endanger human health and the environment. Export of wastes is allowed only if the State of export does not have the technical capacity, the necessary facilities or suitable disposal sites in order to dispose of the wastes in an

environmentally sound and efficient manner, or the wastes in question are required as a raw material for recycling or recovery for industries in the State of import (Article 9 (a) & (b)). The convention does not ban all transboundary movements of hazardous waste; instead it aims to make export of waste costly and difficult so that it becomes profitable to cut down on waste production.[97] While this is an attempt to regulate transboundary movements of wastes at the international level, it has been argued that the Convention legitimizes the trade in hazardous waste and uses such vague and subjective standards as managing the transfer in an 'environmentally sound manner', which is open to abuse.[98] Lack of effective monitoring and control system may put the effectiveness of the regulation in doubt.

Several regional Conventions also have been adopted in order to regulate transboundary movement of hazardous wastes. African states concluded a Convention on the Ban of the Import of Hazardous Wastes into Africa and on the Control of their Transboundary Movement within the continent (Bamako, Jan. 29, 1991). The Convention advocates cooperation between African countries and is based on the principles that: (1) states have the sovereign right to ban the transportation of hazardous wastes and substances into and across their territory and (2) hazardous wastes should be disposed of in the country where they are generated with environmentally sound and efficient management.

Most of the provisions of the Bamako Convention are basically similar with those of the Basel Convention. There are only few distinctions, specifically, in relation to the meaning of waste which is defined in the Convention to include radioactive wastes (Article 2(3)).[99] The regional Convention requires parties to apply the precautionary approach (Article 4(3) (f)). It prohibits the import of hazardous wastes for any reason into Africa from outside the continent and from non-contracting African

[97] The preamble of the Convention declares that "enhanced control of transboundary movement of hazardous wastes and other wastes will act as an incentive for their environmentally sound management and for the reduction of the volume of such transboundary movement". See Kiss and Shelton, supra note 1, p. 212.
[98] Bell and McGillivray, *supra* note 85, p. 564.
[99] Article 1 of the Basel Convention excludes radioactive wastes, which are subject to other international control systems, from the scope of the Convention.

states (Article 4(1)). It also requires parties to impose strict and unlimited liability, along with joint and several liabilities, on hazardous waste generators in Africa (Article 4(3) (b)).

Both Conventions discussed in this section are mainly focussed on the regulation of transboundary movement of hazardous wastes and their restrictions. They remain silent to deal directly with the issue of hazardous wastes disposal. The relevance these Conventions have for the discussions in this chapter is with regard to waste minimization and environmental friendly managements of wastes. They stressed that wastes need to be disposed at the place where they are generated. The Basel Convention, under article 4(2) (a) and (b), requires state parties to ensure that the generation of hazardous wastes and other wastes are reduced to a minimum extent and the availability of adequate disposal facilities, for the environmentally sound management of hazardous wastes. It calls for state parties to co-operate with each other in order to improve and achieve environmentally sound management of hazardous wastes through, for example, exchange of information and technology transfer (Article 10). However, this is not adequate enough to internationally regulate wastes of hazardous nature. More specifically, lack of an international Convention specially designed to deal with hazardous wastes generated from agricultural activities, may leave out some environmentally damaging activities from being fully regulated.

Conclusions

As discussed in Chapter two, the flower industry uses a wide range of pesticides and other agro-chemicals which can cause both human health and environmental problems. A wide range of pesticides in large quantities are imported to Ethiopia for the purpose of flower cultivation. The chapter indicated that as flower farming is relatively new in Ethiopia, it can be difficult to witness impacts on the environment and human health. However, the use of some hazardous pesticides by Ethiopian floricultural companies is confirmed in literatures. The magnitude of the problem will depend on future regulatory measures taken by the government and company initiatives to introduce IPM and other good agricultural practices.

At the national level, the production, trade, transportation, use and elimination of pesticides must be regulated. Registration of pesticides is one ways of regulation that enables states to exclude the production, use and import of pesticides that are potentially hazardous to human health and the environment. The potential effects of chemical substances on humans and the environment, including the long-term risks, are evaluated before granting registration and importing pesticides. For this purpose appropriately trained personnel should be made available to implement and enforce legislation. However, research into the Ethiopian pesticide registration and control system indicates that the system is yet in a process of development.

The chapter identified the main limitations that can create loopholes for entry of hazardous chemicals and misuse of pesticides in Ethiopia. Due to lack of laboratory facilities, the registration processes heavily reliance on the data provided by applicants. There are limited experts to evaluate dossier presented by applicants. Apart from these, there is no full-fledged post-registration inspection of pesticides though this is important to regulate the use, transport and storage of pesticides after they are imported into the country. The regulatory body has no information regarding the products once they are registered and imported though there can be a lot of irregularities, such as sale after date of use expired, removal of the original label approved by the directorate and alteration of packaging requirements. Besides, there is no Pesticide Stock Management System to monitor the distribution and use of imported pesticides. Pesticides are simply imported while available in the country and can satisfy the demand. The problems within the registration system not only can contribute for immediate exposure of the environment to hazardous chemicals, but also lead to accumulation of pesticides in the long term. The chapter discussed the issue of obsolete pesticides and how the problem has been addressed in Ethiopia. But this will remain as a challenge unless the country manages to establish effective pesticide registration and control system.

The majority of pesticides used for flower cultivation are imported without following the formal registration process before APHPD (as required by Pesticide Registration and Control Proclamation). These trend, which was initially arranged to

satisfy the demand for pesticide as the industry started to flourish in Ethiopia, has continued and farms still import pesticides “under special arrangement” to use only on their farms. As a result, neither the list nor the nature of the pesticides is well known by the concerned government organ. The development policy that the country is perusing through attracting investment in the floriculture sector is interfering with stringent pesticide registration system, which is important for environment protection. The example of Ethiopia illustrates the major challenges facing the regulatory systems for pesticides.

The chapter also addressed the issue of waste management in the Ethiopian floriculture industry and the existing regulatory frameworks. In the majority of cases, the ways liquid and solid wastes are handled or disposed are not environmentally sustainable. Empty pesticide containers are buried on a desolate part of the farm, burnt in an on-farm made incinerator barrel or stored in temporary storage facilities. The practice of cleaning tank among some Ethiopian flower farms is described as diluting leftover pesticides and disposing of into a soak away pit. In most cases, wastewater is disposed in ditches or designated area while in other cases directly discharged to water bodies. A legislation that exhaustively governs the management of wastes generated from the flower industry does not yet exist. The Solid Waste Management Proclamation fails to address the regulation of agricultural wastes. It is, thus, important to introduce detailed legislation in order to prevent contamination of soil and water bodies by wastes. Standards need be set to limit the amount of chemicals that can be released into the environment.

The international community responded to the environmental problems posed by the use of certain chemicals and pesticides. Standards in relation to production of POPs are established and trade in certain hazardous chemicals and pesticides are regulated. The Stockholm Convention prohibits or restricts the production and use of POPs which are toxic substances that resist decay and bio-accumulate. On its part, the Rotterdam Convention promotes information exchange about the characteristics of the chemicals and establishes a prior informed consent procedure in order to enable countries know about the nature of the chemicals. With this, they can eliminate those hazardous by nature and difficult for safe management. As

a member party to the Stockholm Convention, Ethiopia is expected to eliminate the production, use and importation of substances listed in Annex A of the Convention, and to restrict those listed in Annex B. Some of the substances listed in the Annexes are insecticides such as DDT. The prior informed consent procedure and exchange of information introduced in the Rotterdam Convention can assist the country in identifying and banning the importation of those pesticides hazardous to human health and the Environment.

In relation to hazardous activities, the Basel Convention establishes a global framework for controlling transboundary trade and movement in hazardous waste and ensuring sound management of wastes that are exported and imported. It promotes the reduction of hazardous wastes generation and promotes environmentally sound management of waste. However, neither this nor other International Convention directly regulate hazardous wastes disposal. In addition, the agricultural sector is not subject to specific international environmental regulation though it might pose significant environmental threats.

Chapter Six: Regulation of Water Resources, Biodiversity and Wetlands in Ethiopia: Some Selected Case Studies

Introduction

Chapter five pointed out major problems in the current regulatory framework for pesticide production, use, import and disposal. It is indicated that the pesticide registration system in Ethiopia is not yet superficially developed. Lack of trained man power, financial limitations, absence of coherence between different policies and weak political determination are identified as major factor affecting the effectiveness of the system. The chapter gave insight into the issue of obsolete pesticides that the country has been facing for years as an indication to the weakness in the pesticide regulation and control system. Despite the measures taken to solve the problem, limitations in the regulatory system and absence of post-registration monitoring are leading to further pesticides accumulation. The fact that floricultural companies are granted with the privilege to import pesticides without following the formal registration system is an inference to discrepancies between the county's policy to encourage investment in the floriculture sector and environmental protection through pesticide control.

The main source of the environmental problem emanates from massive use of agro-chemicals, but the impact eventually extends to affecting water quality and quantity as well as biodiversity. The present chapter is a continuation of the discussion from the preceding chapter and addresses water-related issues and the protection of aquatic life and wetlands. In Ethiopia floricultural companies are established at the shores of freshwater lake and other water bodies. The most notable example of such freshwater lakes is Lake Ziway. Adjacent to the lake is the biggest flower farm in the country- Sher Ethiopia that started constructing greenhouses on nearly 500 ha of land in 2005 and produces roses for commercial export.[1] The company leases part of its greenhouses to four other companies. All

[1] This information is retrieved from the official website of Sher Ethiopia, www.afriflora.nl

these are foreign owned and depend on the lake for irrigation. Currently, though the environmental impact is not as severe as the case of Lake Ziway, Lake Tana is also under threat. A floriculture farm is established at its shore and, potentially, more farms will be attracted to the area. This has been raising concerns about impacts on the quantity of water as flower farms normally use huge amount of water to grow flowers.

The case studies in this chapter demonstrate the main environmental challenges related to flower farming on freshwater lakes. The lakes have enormous environmental, economic and social significances; however, due to lack of proper management and regulation, they are being exposed to degradation partly as a result of excessive water extraction. There are risks of environmental pollution from discharge of untreated effluent, with excessive fertilizer and pesticide residue, by flower farms directly into the lake. As the quality of water decreases, the biological diversity also deteriorates. The biological resources of Ethiopia are already declining at accelerated rate due to population growth, unsustainable level of harvest, an economic system that fails to value the environment, low-level of awareness about ecosystem, and under-investment in biodiversity management. The case studies were carried out during 2015-2016 and were based on literature and legal inquiries.

The other main focus of discussion in this chapter is wetlands protection. Wetlands have great significance as natural and economic resources. They provide a number of ecological benefits, such as groundwater recharge, purification of water, erosion regulation, flood control, and provision of biodiversity, and habitats for birds as well as pollinators. However, the resources are prone to degradation. In the Ethiopian context, as presented in this chapter, the establishment of floricultural companies adjacent to water bodies is a threat to wetlands causing destruction to the resources.

The chapter also indicates possible impacts of flower cultivation on ground water sources. Though Ethiopia possesses high ground water resources potential, the country is with limited capabilities to study and monitor the resources. Accordingly, any large scale abstraction, including by flower companies, that goes beyond safe

and sustainable yield of the aquifer can result in decrease of groundwater levels, flows as well as quality.

As the focus of attention at the international level is significantly on transboundary water bodies, the main corpus of water resource protection is reserved for the regulation of national legislations. Ethiopia has put in place water resource policies and legislations. As indicated in Chapter Three, through legislation governments stir the behaviour of companies with the objective to minimize environmental externalities. Nevertheless, unless there is strong political determination and capacity to enforce legislation, the environment will remain under threat. This chapter identifies major gaps and enforcement problems in water resource management and biodiversity regulation regime of Ethiopia in relation to flower production impacts. Some of the limitations include failure to establish a permit system that basically requires anyone that intends to extract water and/or discharge treated effluents to water bodies, and enforce the legislative requirement to pay fee in order to extract and use water. Though these are among the major principles enshrined in the water resource proclamation, they are absent in practice exposing water resources to overutilization and pollution.

6.1 Ethiopian Flower Cultivation and Water Resources

Water is one of the main inputs in flower cultivation. It is used to grow plants and, after harvesting, to maintain flower quality. According to a data collected in 2010 from 21 farms in the Ethiopian floriculture industry the total water consumption for the production of a bunch of roses was 243 litres.[2] The major sources of water in the industry are ground water from boreholes, surface water from lakes and rain water, respectively.[3] Ground water supplied 68% while Lake Ziway supplied (as only water source) 31.13 % of the total water required. Ground water is mainly used by farms located in the highland cultivation area (i.e. Holleta).[4] However, there are groundwater scarcity problems in this area due to over-concentration of

[2] Abiy Sahle and José Potting, Environmental life cycle assessment of Ethiopian rose cultivation, Science of the Total Environment 443 (2013) 163–172, p. 166
[3] *Ibid*.
[4] *Ibid*., p. 169

commercial farms.[5] The remaining 0.05% was rainwater collected by a farm during wet season to supplement groundwater scarcity during dry season. This indicates that the number of farms that collect and use rainwater is insignificant.[6] There are also few farms that use river and pond water when they face problems to pump water from underground.

Willem de Varies indicates that in Ethiopian rose cultivation, six to seven litres of water are used per square meters per day.[7] This is two times more than what is required to produce rose in the Netherlands where all farms implement recirculation of drained water from greenhouses.[8] Based on the presumption that there is similar evotranspiration in Dutch and Ethiopian greenhouses, it can be said that a substantial amount of water, which could have been saved through recycling, drains directly to the subsoil. Fertilizer residues can also leach into the subsoil with draining water and have way to water resources. A serious problem associated with this is eutrophication, explosive grow of algae and/or bacteria that inhibits oxygen and blocks sunlight putting the survival aquatic life at risk. Chapter Seven discusses that the majority of roses grown in Ethiopia are soil based and only a few companies introduced hydroponics, a method that helps to reclaim and recycle drained water.

6.1.1. Ethiopian Freshwater lakes

Freshwater lakes are among the main sources of water in Ethiopian flower production. The two main lakes whose surface water has been used for these purposes are Lake Ziway and Lake Tana. The following sections provide overview of the lakes and the threats posed by flower production. The lakes are selected for discussion because of their ecological significance and the possible environmental deterioration that likely to actualize in the near future. The following map shows

[5] The Map in Chapter Seven, Section 7.2, shows that in Ethiopia floricultural companies are concentrated in cluster areas where there are water bodies. This exerts pressure on the resource leading to depletion.
[6] See also Willem de Varies (2010), Qualitative comparison of Dutch and Ethiopian rose production systems: *Why Dutch rose growers move to African nations and what consequences does this migration have?,* MSC Thesis, University of Groningen, p. 27
[7] *Ibid*., p. 29
[8] *Ibid*.

the locations of major lakes in Ethiopia, including the lakes discussed in the upcoming sections.

Figure 2: Major Lakes in Ethiopia

Source: www.worldlakes.org

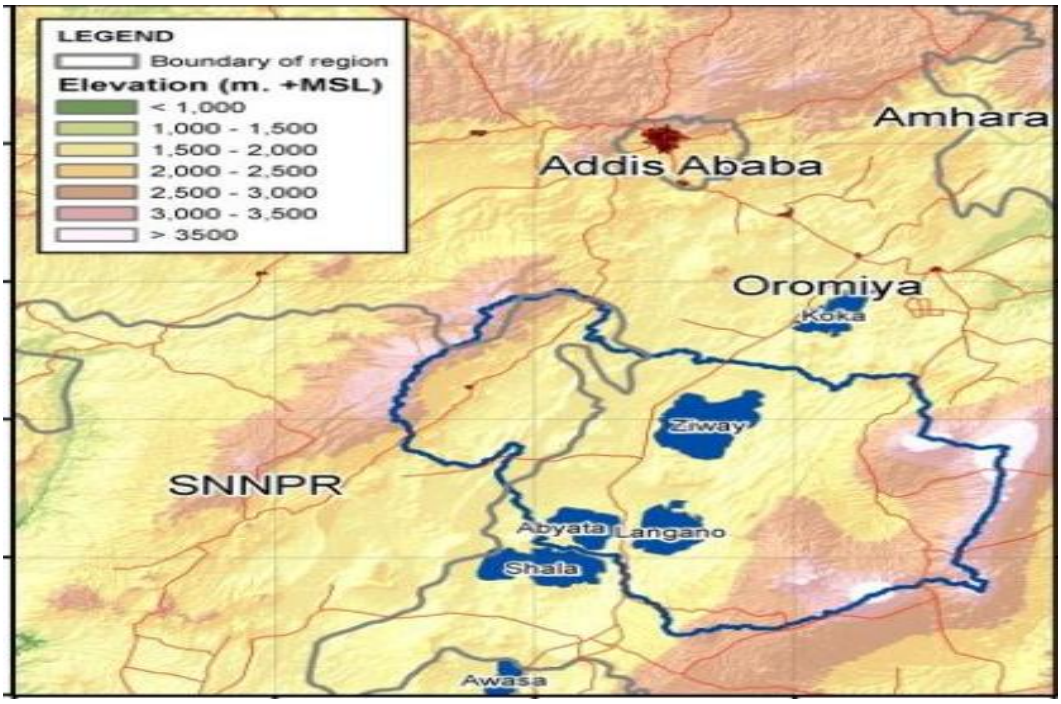
6.1.1.1. Lake Ziway

Lake Ziway [9] is located at 160 km south of Addis Ababa and found in the Ethiopian Central Rift Valley (CRV). The total surface area of the Lake is estimated to be 442 km^2.[10] The maximum depth of the lake is approximately 9 m, while the average depth is only 2.5 m.[11] The volume of the lake is approximately 1.6 km^3.[12] CRV, which is part of the East African Rift that extends along East Africa from the Red Sea to Mozambique, is characterized by a chain of lakes and wetlands. It encompasses, in addition to Lake Ziway, three large lakes: Abyata, Langano and Shala. While Lake Ziway and Lake Abyata are hydrologically connected, Lake Abyata and Lake Shala are important natural reserves and form together a National Park. Lake Langano is

[9] also spelled as Zwai, Zwei and Zeway
[10] Tamiru Alemayehu, Tenalem Ayenew and Seifu Kebede, Hydrogeochemical and Lake Level Changes in the Ethiopian Rift, *Journal of Hydrology* (2006), Vol. 316, pp. 293. Slightly varying hydrological data of the lake is found in different documents.
[11] *Ibid*.
[12] *Ibid*.

connected with Lake Abyata through the Horakela River. Lake Shala is generally separate from the rest of the lakes.

Figure 3: Lake Ziway



Source:http://www.wageningenur.nl/en/Research-Results/Projects-and-programmes/Central-Rift-Valley/Location.htm

I. Overexploitation of Water

Lake Ziway contains freshwater, which primarily has its sources from rainfall and two tributaries- Ketar River and Meki River. The lake has been used for multiple purposes, including as source of domestic water supply, small scale irrigation, bathing, animal watering, fishery and eco-tourism.[13] Irrigation started in the lake's catchment area in the 1970s and it continued to grow since.[14] About 12000 hector

[13] J. Pascual-Ferrer, *et al*, Assessment of water resources management in the Ethiopian Central Rift Valley: environmental conservation and poverty reduction, *International Journal of Water Resources Development* (2014), Vol. 30, No. 3, pp. 572–587; M. Hailu, *et al* (2010) *Survey of anthropogenic impact on rift valley water bodies: The case of Lake Zeway, Langanoo and Abijata*, the Second National Conference of the Ethiopian Fisheries and Aquatic Sciences Association (EFASA), Bahir Dar, pp. 210-216, https://www.aau.edu.et/index.php/efasa-home , accessed on 10 November 2014

[14] Pascual-Ferrer, *et al*, *supra* note 31, p. 577; T. Ayenew and D. Legesse, The Changing Face of the Ethiopian Rift Lakes and Their Environs: Call of the Time, *Lakes & Reservoirs: Research and Management* (2007),Vol. 12, pp. 153.

of land is irrigated in CRV, and water from Lake Ziway sustains 31% of these.[15] The other sources are the following, in order of decreasing importance: Ketar River (27%), groundwater (25%), Meki River (11%), Bulbula River (4%) and spring water (2%).[16] Any additional water extraction by floriculture farms creates pressure on the lake.[17]

A number of factors contributed for the attraction of floriculture development projects to the shore of the lake. These include: agricultural suitability of the lake's water, suitable climatology (high radiation, appropriate day length, cool night and high daytime temperature, favourable humidity) and socio-economic conditions (e.g. availability of land and labour at low costs). Construction of greenhouses by a Dutch owned company, Sher Ethiopia PLC, commenced in June 2005.[18] A year later, the company started operation in some of its greenhouses. The greenhouses are built in blocks of 9 ha with a width of 100m and a length of 900 m.[19] Then, the company leases greenhouse unites of approximately 150 ha to individual companies by retaining 300 ha for its own production. The farm, employing nearly 15,000 workers, sells its roses in different parts of the world after exporting to the Netherlands.[20] The farms that rented greenhouses from Sher Ethiopia -Ziway Roses, RQ Roses, Herberg Flower and Braam Flower[21]- are also foreign owned and cultivate roses for export purposes. Generally, rose production is being carried out in nearly 500 ha using drip irrigation systems where pipelines are laid to each greenhouse from the lake.

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[15] E. R. Vilalta (2010), *Water Resources Management in the Central Rift Valley of Ethiopia,* MSc Thesis in Civil Engineering, Universitat Politecnica De Catalunya, Barcelona, p. 63

[16] *Ibid*.

[17] Ayenew and Legesse, *supra* note 14

[18] http://www.floralife.com/en/spotlight/farm/Afriflora-Sher-Ethiopia , accessed on 31December 2015

[19] *Ibid*.

[20] *Ibid*.

[21] Herberg Rose rented 18 ha. See http://www.herburgroses.com/roses-ethiopie); Ziwayroses(Holaroses) is also Dutch cultivates roses on 42 ha. http://hollaroses.com/ , RQ Roses (sells under the brand Roza Plaza), grows roses on 38 ha. http://www.rosaplaza.nl/uk ; Braam Flowers cultivates roses on 22 ha. All these investors are from the Netherlands, accessed on 31 December 2015.

Flower production requires huge amount of water.[22] Normally, production occurs year-round in plastic greenhouses and entirely depends on irrigation water. The amount of water used depends on different factors, such as the types of greenhouse (with or without recirculation system), water and climate management, etc.[23] If farms re-use drainage water using recirculation systems, the amount of water in use can considerably decrease. In addition to recirculation water system, farms can cover, fully or partly, their water needs by installing rainfall collectors from the greenhouse canopy. In the case of Lake Ziway, such technologies are yet to be installed in the farms, instead the surface water is directly pipelined into greenhouses and used free of charge. Non-availability of incentive (economic or non-economic) to use water efficiently in the CRV watershed is raised as a problem.[24] Lack of effective and full-fledged regulatory mechanism that induces users to minimize water consumption can possibly lead to overexploitation of water. Generally, the management of water in the CRV is weak; there is no planning, regulation and monitoring. The rate of water abstraction is described as 'unsustainable' and the situation will be aggravated if the amount of extraction is increased.[25]

Starting from the 1980s the water level of Lake Ziway has been declining.[26] Since 2002 the lake has been falling by average level of around 0.5m.[27] Furthermore, it is estimated that the level of the lake will drop up to two third of a meter and the surface water will shrink up to 25 km^2.[28] Yet in another report, it is indicated that the lake's level will decline by 0.57 m on average and would sustain a loss of 11% in

[22] H. Hengsdijk and H. Jansen (2006) *Agricultural development in the Central Ethiopian Rift valley: A desk-study on water-related issues and knowledge to support a policy dialogue,* Plant Research International B.V., Wagningen, p. 19, www.pri.wur.nl , accessed on 14 October 2014
[23] *Ibid*.
[24] Vilalta, *supra* note 15, p. 77
[25] *Ibid*., p. 78
[26] Pascual-Ferrer, *et al*, *supra* note 13, p. 577
[27] H. Jansen, et al. (2007), *land and water resource assessment in the Ethiopia Central Rift Valley*, Project: Ecosystem for Water, Food and Economic Development in the Ethiopian Central Rift Valley, Atterra-rapport 1587, Wageningen, p. 10, www.wageningenur.nl , accessed on 14 October 2014
[28] L. Zeray, J. Roehrig, & D. A. Chekol (2006), *Climate Change Impact on Lake Ziway Watershed Water Availability, Ethiopia*, Conference on International Agriculture Research for Development, University of Bonn, October 11-13, 2006, www.tropentag.de/2006/abstracts/full/481.pdf , accessed on 18 May 2016

lake area within the coming 30 years.[29] Though there are slight differences in the figures suggested by the researches, all indicate that there will be significant drop in the lake's level. Recent decrease in the lake's level is associated with water diversion from the two incoming rivers for irrigation and direct pumping from the lake.[30] Though both Ketar River and Meki River used to have substantial flows, these have been affected by uncontrolled water abstractions for small-scale irrigation schemes. When it comes to floriculture farming, non-availability of data and follow-up creates problem to exactly quantify the impact of the industry on the lake's water level. However, as the industry is highly dependent on the use of huge amount of water, its contribution for the fall of the lake's level will be substantial. It was estimated in 2006 that the water consumption from the lake would increase to 20 million m3 per year following the implementation of planed floriculture projects (i.e. Sher-Ethiopia greenhouse complex).[31]

Any activity that affects the water quality and quantity of Lake Ziway is felt in Lake Abyata.[32] Recently water flow from this lake to Lake Abyata, through Bulbula River, has been declining.[33] At the same time, Lake Abyata has been affected by increased water abstraction along Bulbula River for irrigation and direct pumping of the lake's water for commercial exploitation of soda ash.[34] In 2006, the Lake has reduced to approximately 60% of its size in the 1980s and 1990s.[35] Any activity that affects Lake Abiyata causes loss of habitat and wildlife, especially aquatic birds. Thus, the problem is complicated and failure to manage and regulate one ecosystem affects the other, as there is interdependence within the systems.

Vilalta points out that there is limited awarness about water scarcity among water users along Lake Ziway and groundwater sources.[36] Downstream residents of

[29] Vilalta, *supra* note 15, p. 72
[30] *Ibid*., p. 22; Ayenew and Legesse, *supra* note 14, p. 152
[31] Jansen, *et al*, argue that the amount of extraction is "small percentage of the total abstraction by irrigated agriculture" and the main environmental problems are soil and water pollutions associated with excessive pesticide use for flower production. Jansen, *et al*, *supra* note 27, p. 11.
[32] Hengsdijk and Jansen, *supra* note 22; Vilalta, *supra* note 15; Ayenew and Legesse, *supra* note 14
[33] Vilalta, *supra* note 15, pp. 22-23
[34] *Ibid*.
[35] *Ibid*., p. 72
[36] *Ibid*., p. 63

Bulbula River associate the problem with floriculture farming near Lake Ziway. Urban water users pay more attention for water quality than quantity probably because of the availablity of the water supply throughout the year.

II. Environmental Repercussions

Deterioration of water quality is another worth considering issue. Lake Ziway supports a wide variety of wildlife such as birds, fish (six indigenous and four exotic species), phytoplankton, zooplankton and other micro flora.[37] The surrounding wetland of the lake is home to many endemic birds and wild animals. However, the discharge of untreated effluent, with excessive fertilizer and pesticide residue, from farms directly into the lake, is causing environmental risk of pollution.[38] Researches confirm that each farm has in use a water-way from the greenhouse to the lake to drain effluents.[39] In 2010, it was confirmed that effluents contain pesticide residues; some of which are classified as high risk pesticides and moderate toxics.[40] Discharge of untreated effluent to the lake, therefore, can have adverse impacts on aquatic ecosystem. It is indicated that "the observed water pollutions are comparable with the situation of intensive agricultural production systems elsewhere in the world such as Europe, USA and South-east Asia".[41] Apart from this, effluents from washing of equipment are directly discharged into the lake without any waste water treatment procedures.[42] This can potentially affect the water quality of the lake and aquatic life. Salinity and mineral content of the lake increased over the last 40 years possibly due to evaporation, water abstraction and imbalance between inflows and outflows of the lake's water.[43] Water outflows from the lake before 2003 was sufficiently high and the chemical characteristics of the

[37] Ayenew and Legesse, supra note 14; M. Hailu (2011), *Ecosystem structure, trophic link and functioning of a shallow rift valley lake: the case of Lake Ziway (Ethiopia),* MSc Thesis, School of Graduate Studies, Addis Ababa University
[38] Ayenew and Legesse, *supra* note 14
[39] Vilalta, *supra* note 15, pp. 63-64; Malefia Tadele (2009) *Environmental Impacts of Floriculture Industries on Lake Ziway: With Particular Reference to Water Quality,* MSC Thesis, School of Graduate Studies, Addis Ababa University, Ethiopia
[40] H.C. Jansen and J. Harmsen (2011), *Pesticide monitoring in the Central Rift Valley 2009-2010, Ecosystems for Water in Ethiopia, Land Use Planning Program for the Central Rift Valley of Ethiopia*, Alterra-report 2083, Wageningen UR, Wageningen
[41] *Ibid*., p. 18
[42] Tadele, *supra* note 39
[43] Ayenew and Legesse, *supra* note 14, p. 158

lake were almost identical to its main inflows.[44] However, recent trends make the water quality to highly deteriorate. Excessive nitrate and phosphate residues are found in effluents and are causing algal blooms around the outlet of the farm.[45] Extremely toxic pesticides, including endosulfan, are used.[46]

Lake Ziway is surrounded by wetland which is swampy and with floating vegetation and high concentration of phytoplankton.[47] The vegetation along the lake's edge provides food and shelter for numerous animals.[48] Any disruption to the vegetation, either by direct human intervention (i.e. irrigation or deforestation) or as a result of lake level decrease, will have environmental consequences. Also terrestrial flora and fauna around the lake depend on the lake's ecological integrity. Apart from this, the lake supports heavy fish stock in the region and it has been the principal commercial fishing source in the country. Accordingly, any activity that alters the lake and its wetland will have economical implication in addition to affecting the ecosystem.

Generally, careful consideration must be made on any further abstraction from the Lake and its tributeries. It is also important to regulate activities that brings environmental repercussion on the lake. The drop in the lake level and deterioration of water quality can affect the sustainability of the flower farms and can have negative impact on fisheries, local communities and tourism. While the lake has been used intensively and increasingly for agricultural, domestic and industrial purposes, there is limited knowledge about the chemical suitability of the water. There should be follow-up mechanism to record the chemical level of the lake, which is an important step in reducing the threat to human and animal health.[49] It is, generally, suggested that the management of water resources and planning need to be improved.[50] Measures to reduce excess water use and any water loss, for example through improving the quality of irrigation system, may be

[44] *Ibid*.
[45] Tadele, *supra* note 39; Jansen and Harmsen, *supra* note 40, p. 23.
[46] *Ibid*.
[47] Ayenew and Legesse, *supra* note 14
[48] Hailu, et al., *supra* note 13, p. 214
[49] Pascual-Ferre, *et al*, *supra* note 13
[50] Ayenew and Legesse, *supra* note 14, p. 156

required on the part of companies. Some measures in sustainable water consumption are suggested in Chapter two. Efforts to protect surface water sources requires creating co-operation between parties that highly compete for the resource, i.e. floricultural companies, smallholder farmers and others.

6.1.1.2. Lake Tana

Lake Tana is situated in the north-western highlands of Ethiopia, in the Amhara Regional State. It is described as shallow, oligotrophic and freshwater.[51] With a total area of 3156 km^2, stretching approximately 84 km north-south and 66 km east-west, it is the largest lake in the country.[52] The depth of the Lake is on average 9 m and maximum 14 m. The total catchment area is estimated to be 16,500 km^2, 65% of which is seasonally flooded extensive wetland.[53] Five major permanent rivers, which contribute more than 95% of the total annual inflow, and more than 30 seasonal streams feed the lake, whereas the Blue Nile is the only surface outflow from the lake (one of the major tributaries of the Nile and contributes 85% to the total flow of water).[54] The Lake accounts for 50% of the total inland water of the country.[55]

[51] S. Kebede, Y. Travi, T. Alemayehu and V. Marc, 2006. Water balance of Lake Tana and its sensitivity to fluctuations in rainfall, Blue Nile basin, Ethiopia, *Journal of Hydrology* (2006), Vol, 316, p. 234; A. Sewnet and K. K. Rao, Hydrological Dynamics and Human Impact on Ecosystems of Lake Tana, Northwestern Ethiopia, *Ethiopian Journal of Environmental Studies and Management* (2011), Vol. 4, No. 1, p. 57

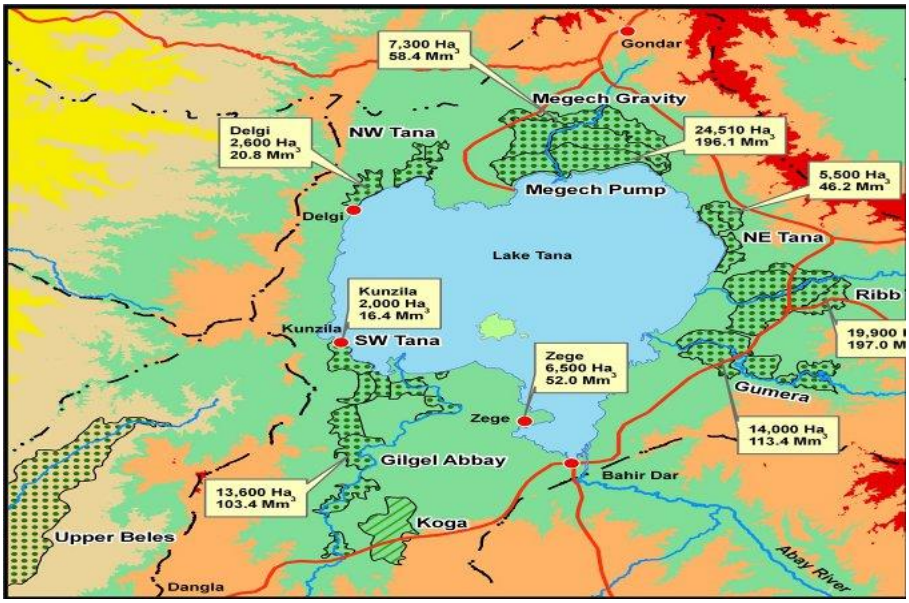
[52] Kebede, *et al*, *supra* note 51, p. 236

[53] *Ibid*.

[54] *Ibid*., p. 234

[55] Friedrich zur Heide (2012), *Feasibility Study for a Lake Tana Biosphere Reserve, Ethiopia,* Federal Agency for Nature Conservation, Bonn, p. 28 http://www.bfn.de/0502_skripten.html , accessed on 10 December 2014

Figure 4: Lake Tana



Source: Nile Basin Initiative, Eastern Nile Technical Regional Office[56]

I. Environmental Values and Ecology

The lake, with the surrounding wetland, is rich in biodiversity. [57] Supporting more than 251 bird species, nearly 65 species of fishes (a quarter of which are endemic) and 85 species of phytoplankton and 25 species of zooplankton, it is listed in the top 250 lake regions of global importance for biodiversity.[58] The vegetation in the lake's shore area is dominated by three kinds of plant communities.[59] Trees (e.g. Syzgium guineense) and shrubs are found in rocky shore areas, where as Scirpus

[56] Lake Tana, Nile Basin Initiative, Eastern Nile Technical Regional Office http://entroportal.nilebasin.org/ENID/Pages/IPPEthiopiaGumara.aspx

[57] J. Vijverberg, F. A. Sibbing and E. Dejen, "Lake Tana: Source of the Blue Nile" in H. Dumont (2009) (ed.), *The Nile: Origin, Environments, Limnology and Human Use,* Springer Science + Business Media B.V., pp. 163-192; Ayalew Wondies (2010), *Current land use practices and possible management strategies in shore area wetland ecosystem of Lake Tana: Towards improving livelihoods, productivity and biodiversity conservation,* Management of shallow waterbodies for improved productivity and peoples' livelihoods in Ethiopia, Bahir Dar , EFASA, pp. 9-16; Heide, *supra* note 55

[58] Assefa Melesse and Wossenu Abtew (2015), *Landscape Dynamics, Soils and Hydrological Processes in Varied Climates*, Springer, Switzerland, p. 345. In 2001, LakeNet after conducting a study, identified lakes for priority conservation. From more than 5 million lakes on the plant, it selected 250 lakes in 73 countries based on UNEP, WWF and Ramsar Data. Lake Tana is among the priority lakes in Africa. See http://www.worldlakes.org/projects.asp?projectid=18&programid=1 , accessed on 11 January 2016.

[59] Wondies, *supra* note 57, p. 13

and Polygonum species dominate the north and east shore areas. The south-western gulf shore area of the lake is covered by Papyrus and Typha. Also the lake is major cultural and archaeological site. Ancient churches and monasteries built on the lake's islands during the 13th and 14th Centuries are major tourist attractions. Generally, more than 500,000 people depend directly and indirectly on the lake and adjacent wetlands for livelihood.[60]

Wetlands are found all around Lake Tana, except in the Northeast.[61] They consist of permanent swamps, seasonal swamps and areas subject to regular inundation, and play important role in maintaining environmental quality and supporting biodiversity. They form integral parts of the Tana-ecosystem through providing breeding ground and habitat for water fowl, mammals and fish species.[62] It is an important roosting site for migratory bird species, and provides habitats for several endangered and endemic species. The vegetation regulates nutrient and sediment flow that serves as ecological buffer zone. Yet natural causes and human activities are altering the wetlands by affecting their ecological functions and self-restoration abilities.[63]

II. **Economic Values**

The lake and its catchment have enormous potentials for irrigation, hydroelectric power development and ecotourism.[64] It is selected by the Ethiopian government as one of the potential growth corridor for development and to reduce food insecurity problem. Water resource development activities started in 1960s with the construction of Tis Abay-I electric power station 35 km downstream of the Lake's outflow. In 1996 water level regulation weir was constructed at the shore of

[60] Vijverberg, *et al*., *supra* note 57, p. 165
[61] *Ibid*.
[62] *Ibid*.; Wondies, *supra* note 57
[63] A. Sewnet and K. K. Rao, Hydrological Dynamics and Human Impact on Ecosystems of Lake Tana, Northwestern Ethiopia. *Ethiopian Journal of Environmental Studies and Management* (2011), Vol. 4, No. 1; D. Molla, N. Chlosom and P. Enright, Putting research knowledge into Action: The missing link for sustainability of Lake Tana Ecosystem, Ethiopia. *Ethiopia e-journal for Research and Innovation Foresight (*2011), Vol. 3, pp. 4-19; Heide, *supra* note 55
[64] Kebede, *et al*., *supra* note 51; Heide, *supra* note 55; M. McCartney, *et al* (2010) *Evaluation of Current and Future Water Resources Development in the Lake Tana Basin, Ethiopia,* IWMI Research Report 134, International Water Management Institute, Colombo

the lake for continuous water supply to the hydropower plant during dry seasons.[65] The second power station- Tis Abay II was built in 2001, 100 m downstream of Tis Abay-I and become operational. Recently, the lake's water has been diverted for the development of Tana-Beles hydroelectric power project. It involves the transfer of water from the western side of the lake to Beles River (tributary of the Blue Nile River) via a 12 km long and 7.1 m diameter tunnel.[66] Small scale irrigations have been practiced within the catchment area of Lake Tana on fragmented lands.[67] A number of large scale irrigation schemes are planned, including the constructions of dames on some of the inflowing rivers (such as Megech, Rib and Gumara).[68]

Both the Federal government and Amhara Regional State encourage floricultral investment, particularly in the vicinity of Bahir Dar city and Lake Tana.[69] Suitable land has been made available for flower production and cold room is constucted at the city's airport to cater for a direct cargo flight to the international market. So far, 700 ha of land is allocated in the region for six companies, four of which are established near Bahir Dar city. Two of these companies (Tana Flora and Giovani Alfano) already started exporting flowers, while the others are finalizing construction of greenhouses. Additional 1000 ha of land are identified in different locations (South Achefer, Mecha, Dera Anbesame, Bahir Dar Zuria, Fogera), out these 470 ha are located between 6 to10 km distance from Lake Tana.[70] Surface water from the lake will be used for flower cultuvation. Though these development activities play significant role in the effort to boost the country's economy, they may, at the same time, cast doubt over the sustainability of the lake and its surrounding ecosystem.

[65] Kebede, *et al*., *supra* note 51, pp. 235-236
[66] McCartney, *et al*., *supra* note 64, p. 5
[67] *Ibid*., pp. 3-4
[68] *Ibid*.
[69] *Hands-on Investment Guide: Amhara Regional State Ethiopia: Horticulture, Floriculture and Dairy,* 2014, Embassy of the Kingdom of the Netherlands, Addis Ababa, Ethiopia, www.amhara.gov.et , accessed on 15 March 2015
[70] *Ibid*.

III. Environmental Threats

A. Wetland (Habitat) Destruction

Most of the wetlands around the lake are under threat and modification by different causes. There is over-utilization and change in land-use practices, such as heavy cattle grazing, clearing of the vegetation and excessive water exploitation of wetlands.[71] They have been widely converted to farm and settlement lands due to population pressure and expansion of agriculture. Particularly, at the eastern side of the lake, rice is widely cultivated on the land of the Fogera floodplain that used to provide habitat for waterfowls and fish stocks.[72] This causes destruction of the ecosystems and poses threat to biodiversity. In addition, the papyrus population around the Lake has dramatically declined due to over exploitation and habitat fragmentation. The problem is accompanied by low level of awareness among local communities about the sensitivity of wetland ecosystems and their conservation.[73] In addition to these, the use of the lake's water resources for hydroelectric power generation has been causing the decline in the lake's level in different times.[74] For example, in 2003, the lake's level dropped sharply and navigation was ceased for approximately four months as production at Tis Abay power station was maximized.[75] The drop in the lake's level also has impact on Wetlands.

B. Pollution and Drop in Lake Level

Previous researches confirm that, unlike the Ethiopian rift valley lakes, the level of Lake Tana remained regular over the last 40 year or more.[76] It was argued that the lake is "less sensitive to rainfall variation and changes in catchment characteristics".[77] Nevertheless, recent researches indicated that agricultural activities, industrial pollution and overutilization are affecting the lake and its

[71] Heide, *supra* note 55, p. 36
[72] *Ibid*., p. 32
[73] *Ibid*., pp. 33-34
[74] Sewnet & Rao, *supra* note 63, p. 60; Molla, *et al*.,*supra* note 63, p. 9
[75] McCartney, *et al*., *supra* note 64, p. 5
[76] Kebede, *et al*., *supra* note 51, p. 244
[77] *Ibid*., p. 233

wetland.[78] Sewnet and Rao concluded, after evaluating land cover modification in the southern part of the lake's catchment, the last 30 years temperature, rainfall and lake level data as well as population change and development activities, that more than 6.2% of the lake's area was converted to other land use and the lake's level has declined.[79] They stressed that the change in Lake Tana water was caused by human factors and climate change. The decline in the lake's level is associated with intense land cover modification in the catchment areas and climate change, manifested by rainfall decline and temperature rise.

Over the last 10 years the water level of the lake dropped by about 1-2 meters causing major challenge for navigation and fishing.[80] Siltation is being noticed, which is a major problem since the lake is shallow in depth.[81] It is predicted that if future planned development initiatives (i.e water diversion for hydropower and irrigation) on Lake Tana are fully implemented, the level and the average surface area of the water will decrease by 0.44 m and 30km^2 (i.e. 3000 ha) respectively.[82] This will possibly have impact on the ecology of the lake and its wetland.

As floricultural development at the lake's shore is a recent phenomenon, it may be difficult to associate the noticed environmental changes to flower farming. However, any additional water use, including for floricultural farms, will create pressure on the resource unless there is effective management. Currently, there is lack of institutional capacity, effective regulatory mechanisms and coordination among concerned government authorities which leads to limited ability to manage the water body and its resources.[83] The lake is dumping site for municipal, industrial and domestic wastes of the adjacent Bahir Dar town. Solid wastes and effluents from residences, factories and hotels reach the lake untreated.[84] The environmental impact will be immense when farms that use huge amount of agro-

[78] Sewnet & Rao, *supra* note 63; Wondies, *supra* note 57; McCartney, *et al*., *supra* note 64; Vijverberg, *et al*., *supra* note 57
[79] Sewnet & Rao, *supra* note 63
[80] Wondies, *supra* note 57
[81] *Ibid*., p. 16; Heide, *supra* note 55, p. 22
[82] McCartney, *et al*., *supra* note 64, p. 27
[83] Wondies, *supra* note 57, p. 15; Heide, *supra* note 55, pp. 37-38
[84] Heide, *supra* note 55, p. 48

chemicals are established on the shore of the lake and there is lack of effective regulatory mechanism.

Serious environmental problems can result when companies establish near the lake. As indicated above, it is within the plan of the government to allocate land in the vicinity of the lake (between 6 to10 km) to flower farmers that will abstract water from the lake to cultivate flowers. A company is already established on 124 ha of land at the shore of the lake within the distance of 2.7 km. It grows roses using surface water from the lake and exports to foreign market. The water body can easily be contaminated by surface runoff containing pollutants that can have damaging effect on fish resources and other aquatic life. Excess increment of nutrients in water bodies (i.e. eutrophication) can lead to gradual loss of flora and fauna and aggravation of human health problems. Any future development on the lake and incoming-rivers, including dams, irrigation and hydropower, may add pressure on the lake and have impact on the ecosystem.[85]

Though the main source of water is Lake Tana, there are plans to use rivers and groundwater resources for flower farming on some of the identified lands.[86] In South Achefer, for example, two rivers (Asher and Pikkolo Abay) have been proposed as potential water sources to cultivate 110 ha of land. Groundwater is expected to be used in the identified land in Fogera. In relation to this, it is important to question what possible direct impact these development plans might have on the resources (for instance, pollution and overutilization) and on local communities that depend on the water resources for their livelihood.

6.1.2. Use of Groundwater Resources for Floriculture

Ethiopia possesses high groundwater resource potential which is estimated 2.6-6.5 billion m^3.[87] Most of these are freshwaters with total dissolved solids less than 1500

[85] Wondies, *supra* note 57, p. 16; McCartney, *et al*., *supra* note 64
[86] Hands-on Investment Guide, *supra* note 69
[87] S. B. Awulachew, *et al*. (2007), *Water Resources and Irrigation Development in Ethiopia,* Working Paper 123, International WaterManagement Institute, Colombo, p. xi

mg/l.[88] The groundwater can be classified as bicarbonate, sulphate and chloride types. Bicarbonate is the main anion in the groundwater of north-western and south-eastern plateaus of the country while sulphate is dominant in the areas where sedimentary rocks are found. Similarly, the groundwater in most of the Central Ethiopian rift is bicarbonate type tending to sulphate. Chloride type of groundwater is mainly found in the northern part of the Afar Depression.

The groundwater resources of the country are suitable for different purposes.[89] The exception to these could be those with high fluoride contents found in the rift that require quality treatment. However, utilization of groundwater has been limited to community water supply using shallow hand dug wells and from unprotected springs.[90] Few deep boreholes were drilled in some rural areas, mainly in the rift valley, peripheral semi-arid regions and highland volcanic terrain. Use of deep groundwater from boreholes for agriculture has been almost non-existent.[91] It is evident that promotion of ground and surface water developments can provide opportunity to improve agricultural productivity and food security. Yet, it is only recently that the development of groundwater resources started to get attention.

Companies in the floriculture sector depend on groundwater resources to grow flowers.[92] With increasing trend in the use of groundwater resources for floriculture development, there are concerns about long term impacts on the resource and the environment.[93] One of these relates with large scale abstraction that goes beyond safe and sustainable yield of the aquifer. This can result in decrease of groundwater levels, flows as well as quality. The deterioration of groundwater quantity and quality may affect water supplies of the nearby communities.

In order to utilize groundwater resources properly, detailed assessment of groundwater resources should be conducted.[94] This is particularly true in relation to

[88] Tamiru Alemayehu (2006), *Groundwater occurrence in Ethiopia,* Addis Ababa University, Addis Ababa, pp. 3 & 76
[89] *Ibid.*
[90] *Ibid*., pp. 3-4; Awulachew, *et al*., *supra* note 87, p. 6; Vilalta, *supra* note 15, p. 20
[91] Alemayehu, *supra* note 88, p. 4
[92] Sahle & Potting, *supra* note 2; Hengsdijk & Jansen, *supra* note 22, p. 1
[93] Hengsdijk & Jansen, *supra* note 22
[94] Alemayehu, *supra* note 88; Awulachew, *et al*., *supra* note 87

sustainable abstractions of groundwater quantity and quality. Having a clear understanding about the occurrence and distribution of the groundwater is important. Once the assessment is made, there should be proper management and efficient exploitation which requires technical capability and human resources. However, all these are lacking in Ethiopia where there are very limited available studies on groundwater resources.[95]

6.2. Regulation of Water Resources

6.2.1. Water Resources Management

We have already seen that the Constitution of Ethiopia recognizes the right to live in a clean and healthy environment, and requires the Government to make every effort to provide such an environment.[96] It is the responsibility of both the Government and the people of Ethiopia to preserve natural resources and maintain ecological balances.[97] In light of these principles of the Constitution, policies and proclamation were introduced with the objective to protect and manage natural resources. In relation to water resources the country adopted National Water Resources Management Policy in 1999 and National Water Sector Strategy in 2001. Also a proclamation was issued to provide for the management, regulation and operations of water resources. This was followed by Regulation No. 115/2005.

6.2.1.1. Water Policy and Strategy

The National Water Resources Management Policy aims to promote efficient, equitable and optimum utilization of available water resources for sustainable socioeconomic development of the country.[98] The policy stresses that the water resources are to be developed for economic and social benefits of the people and on equitable and sustainable basis. As it is fundamental for the achievement of these objectives, the policy stated protection and conservation of water resources and the overall aquatic environment as one of its objectives.[99] Further, it recognizes

[95] Awulachew, *et al*., *supra* note 87, p. 6
[96] FDRE Constitution, 1995, Article 44 and Article 92 (1)
[97] *Ibid*., Article 92(4)
[98] *National Water Resources Management Policy*, 1999, Ethiopia, Pa. 1.1
[99] *Ibid*., Pa. 1.2

the need to introduce a comprehensive plan for allocation of water that incorporates the principles of efficiency, equity of access and sustainability. The scarce and vital socio-economic nature of the resource require the management to be based on strategic planning which is founded on long term visions and sustainable objectives.[100]

The document sets out general management policy on water resources and promotes a number of core policy principles.[101] One of these is the recognition for every citizen's right to have access to sufficient water of acceptable quality. It states that "water is a natural endowment commonly owned by all the peoples of Ethiopia" and its management requires the involvement of and collaboration among stakeholders.[102] The resources that are commonly owned by the people can only provide the sought benefits where there are effective protection and preservation. In relation to these, the policy demands the introduction of appropriate mechanisms to protect the water resources of the country from pollution and depletion.[103] It requires the formulation of quality and quantity standards for water utilization, and the regulation of human activities that are detrimental to water resources such as waste discharges. These measures are important to control discharges and effluents into water courses. In order to enhance the preservation of aquatic resources, the policy encourages the introduction of proper assessment procedures. Apart from this, it aims to integrate effectively environmental protection and management issues into water resource administration and encourages the undertaking of environmental impact assessment before project implementation.[104]

The document also incorporates policy issues on groundwater resources.[105] It states that the country's ground water resources need to be assessed in terms of their spatial and temporal occurrence and distribution. The exploitation of ground water is expected to be based on "abstraction of the maximum amount equal to the

[100] *Ibid*., Pa. 2.1.1
[101] *Ibid*., Pa. 1.3 and Pa. 2.1
[102] *Ibid*.
[103] *Ibid*., Pa. 2.2.2
[104] *Ibid*., Pa. 2.2.2
[105] *Ibid*., Pa. 2.2.6

sustainable yield".[106] The policy suggests the establishment of norms, standards and general guidelines for sustainable and rechargeable management of ground water.

There are also policy issues pertaining to water allocation, apportionment and pricing.[107] The document recognizes basic minimum requirement as the highest priority in any water allocation plan. In the process of water allocation highest priority is given for water supply and sanitation while the criterion for the rest users is highest socio-economic benefits. In relation to pricing, the policy, by giving recognition to the economic value of water, promotes the need to ensure payment of fees for services rendered.[108] It particularly promotes the 'User Pays' principle in the supply of water for industrial and other users.[109] Any decision regarding industrial water demands need to take into account futures needs and development plans.

Following the Water Resource Management policy, the county adopted the Water Sector Strategy whose main objective is to translate the Policy into action. The Strategy provides a 'road map' to attain the water policy objectives and aims, more specifically, to make meaningful contributions towards: improving the living standard and general socio-economic wellbeing of the Ethiopian people, realizing food self-sufficiency and food security in the country, extending water supply and sanitation coverage to large segments of the society, and enhancing the contribution of water resources in attaining national development priorities. It promotes the principles of integrated water resource management. This requires the management of water to take account of the variety of uses (such as agriculture, domestic and industrial use; fisheries; hydro-power generation; navigation and recreation) and impacts of water.[110]

The Water Sector Strategy incorporates similar but detailed policy issues as the Water Resource Management Policy. This is particularly true in relation to water

[106] *Ibid*., Pa. 2.2.6(2)
[107] *Ibid*., Pa. 2.2.1
[108] *Ibid*., Pa. 2.2.5(B)
[109] *Ibid*., Pa. 4.2(c)
[110] J. McEldowney and S. McEldowney (2010), *Environmental Law,* Longman, Essex, p. 268

resource protection. It is stated in the strategy that environmental conservation and protection will be treated as an integral part of water related projects.[111] To this end, environmental impact assessment is mandatory for all water resource projects. As part of the process, impacts of water withdrawal from surface or ground water resource on local economies and the environment will be assessed in order to indicate mitigation measures. The reliability and sustainability of the resources need to be determined. Apart from this, the strategy promotes the prevention of indiscriminate discharge of industrial effluents into water courses without adequate treatment.[112] It encourages the assessment of the impacts of disposal systems on local water resources in situations where the disposal systems discharge to the nearest watercourses such as a stream, river or lake.[113]

6.2.1.2. Legislative Framework

It has been suggested in the Water Resource Management policy that introducing water resources legislation is important to allow all citizens to have access for water.[114] It was also stressed on the need to provide legal basis for active participation of all stakeholders in the management of water resources and legislative framework for penalties related to violations. Accordingly, Water Resource Management Proclamation (No. 197/2000) was enacted to provide legal ground for the implementation of the policy. As its purpose, the proclamation seeks to ensure the utilization, appropriate protection and proper management of the county's water resources for the highest social and economic benefits of the people.[115] Following the proclamation, the Council of Ministers Ethiopian Water Resources Management Regulation (No, 115/2005) was issued to give detail account to water related issues.

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[111] *National Water Sector Strategy*, 2001, Ethiopia, Section 4.1.10
[112] *Ibid*., p.6
[113] *Ibid*., p. 11. The strategy recommends better project design and operation; awareness raising among industrial managers about methods of impact minimization of industrial wastes on water quality; and wastewater recycling as alternative methods to reduce adverse impacts on water resources and the environment.
[114] Water Resource Management policy, *supra* note 96, Pa.2.2.13 (c)
[115] Water Resource Management Proclamation, No. 197/2000, Article 3

I. Permit System to Use Water

Different water related issues are governed by the Water Resource Management Proclamation. Under Article 5, the proclamation declares, "[a]ll water resources of the country are the common property of the Ethiopian people and the state". This implies that one cannot privately own water resources but only have legal right to use the resources. Any person (including companies) interested in using these common pool resources is required to obtain permit from the Ministry of Water Resources or any organ delegated by the Ministry. The types of activities that require permit are enumerated under Article 11(1) of the proclamation. These are: construction of waterworks (defined to include diversion, clearing, dam construction, drilling, regulation, purification, transportation, desalination and other similar works) (1); supply of water for personal use or for others (2); transfer of abstracted water by oneself or received from another supplier (3); and release or discharge of waste into water resources (4). Yet permit is not required to dig water wells by hand or use water from hand-dug wells, and to use water resources for traditional irrigation, artisanal mining, traditional animal rearing and water mills.[116] Thus companies that depend on surface water or ground water for flower cultivation and dispose treated wastes to water bodies need to obtain permit.

The responsibility to grant permit for water resources rests on the Ministry of Water Resources (currently established as the Ministry of Water, Irrigation and Electricity) or organ delegated by the Ministry. The latter are government authorities established by proclamation, such as Awash River Basin Authority, Abay River Basin Authority, Omo- Gibe River Basin Authority, Rift-valley Lakes Basin Authority (recently established) and water resource management bodies established in each regional administrations whose structural arrangement extends to local level. All these are responsible to grant water use permit on any water resource that exists within their boundaries or under their administration. [117]

[116] *Ibid*., Article 12

[117] But there are debates between Basin Authorities and States about powers to grant use permit over water resources found within States. State governments argue that the Constitution guarantees the rights of states to use and administer natural resources within their boundaries. On the other

Any person that intends to use water resources should lodge an application by stating, among other things: the intended use of the water resources; the volume of water required; intended method and manner of use of the water resources and feasibility studies.[118] The Ministry or delegated organs, before granting a permit, are required to make sure that the proposed use of water does not infringe, in any manner, any person's legitimate interests upon the water and entail pollution or harmful effects on the water resource as well as the environment.[119] Individuals that have been granted with a permit by any public body or without such a permit are duty bound to apply for a permit within 12 months from the coming into force of the regulation (which is 19th March, 2005) to continue benefiting from the water works, to use water or to discharge wastes into water bodies .

A permit can be suspended or revoked (terminated) in whole or partially.[120] Particularly, it can be suspended when there is failure to comply with the terms and conditions prescribed in the permit; a use of water for purposes not authorized; a failure to pay the required water charges; and a failure to keep a water quality standard.[121] On the other hand, a permit can be terminated when it was obtained by giving false evidence; the water resources involved is being permanently depleted; and the use of the water resources causes negative impact on the environment.[122]

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hand, River Basin Authorities are established to administer rivers and their tributaries which normally flow into or cross more than one state. The directorate is working (negotiates and mediates) to solve the problem and clarify the issue related to power and responsibility. Interview with Mr. Kifle Alemayehu, Water Utilization Permit and Administration Directorate, Director, Ministry of Water, Irrigation and Energy, 20 July 2015. Because of the loophole, companies use water without permit. It does not seem that there is clear division of responsibility between river basins authorities, which are structurally found under the Ministry of Water, Irrigation and Energy. During interview held with Mr. Kifle, it was explained that the directorate grants water use permit over resources that it administers. The constitution states that while federal government administers water resources that cross the boundaries of two or more states, states governments administer water resources found within their boundaries.

[118] The Council of Ministers Ethiopian Water Resources Management Regulation, No. 115/2005, Article 3

[119] Proclamation No. 197/2000, *supra* note 115, Article 14(1)

[120] *Ibid*., Article 17

[121] Regulation No. 115/2005, *supra* note 118, Article 6(2)

[122] *Ibid*., Article 6(3)

The Water Utilization Permit and Administration Directorate, under the Ministry of Water, Irrigation and Electric, was approached for interview with the objective to investigate how in practice the water use permit system functions. During interviews held with the personals of the directorate, it was indicated that, as a general principle, it is a requirement for all companies that intend to engage in the industry (textile, water bottling,) and agriculture sectors to apply with the directorate or other delegated bodies to get water use permit.[123] However, there is no well-established permit system under the Ministry or delegated bodies. Permits are simply granted without thorough investigation of environmental impacts contrary to that stipulated in the Proclamation. As outlined above a water use permit will be granted in a manner that does not infringe any person's legitimate interests upon the water or entail harmful effects (e.g. pollution, impact on water level) on the water resource and its ecology. One of the main obstacles for the implementation of this requirement is deep rooted attitude among the directorate and delegated organs that denying water use permit for applicants might amount to obstruction to the country's interest to enhance investment.

Mr. Kifle Alemayehu, Water Utilization Permit and Administration Directorate Director, acknowledges the need to evaluate every application in light of the requirements and considerations under Proclamation, but this procedure is absent and applicants are not usually denied with the permit.[124] He notes that more attention is paid for the issue how to support and encourage an investor to implement a project, not to the resources upon which the investment depends. The fact that investors apply for water use permit after they are issued with investment license created wrong impression among permit grating institutions and lead them to believe that denying the permit will impede investment. Investors, after acquiring investment permit, are yet expected to go through different procedures that include processing business license, identifying place of investment and land

[123] Interview with Mr. Kifle Alemayehu, *supra* note 117; Interview with Mr. Belachew Niguse, Hydrologist, Water Utilization Permit and Administration Directorate, Ministry of Water, Irrigation and Energy, 20 July 2015

[124] Interview with Mr. Kifle Alemayehu, *supra* note 117

leasing. Accordingly, the procedure should not have created a problem on its own if there have been effective functional linkage between government institutions.

In addition, the Directorate and delegated organs are not usually consulted about the availability and sustainable use of water resources before land allocation and project implementation.[125] It was highlighted during interview that in some cases the Directorate learns about water use after investors start developing lands and it is common to observe over concentration of investments on a single water resource.[126] This can affect the water balance of the resource, the sustainability of investment projects, down flow of water and the ecology. Apart from these, some River Basin Authorities are only recently established and all government institutions responsible to administer water resources are with financial constraints and limited human resource capabilities to regularly monitor, in terms of quality and quantity, and protect the country's water resources.[127]

II. Environmental Impact Assessment

Both the Water Sector Strategy and the Water Resource Management Policy promote environmental impact assessment (EIA) in all water related projects. Not only these but also the Environmental Policy of Ethiopia underlines on the importance of undertaking EIA.[128] "Floriculture and horticulture development for export" is listed among the types of projects that should go through EIA in Directive No. 2, 2008. The procedure involves, among others, evaluation of impacts related to water withdrawal both from surface and ground water resources on the environment and indicates mitigation measures. However, not all floricultural investment projects went through the procedure. Only some floricultural companies produced EIA reports, partly, for the purpose of obtaining loan from the Development Bank of Ethiopia under the arrangement made between the Bank and

[125] *Ibid*.
[126] *Ibid*. This issue was raised by Getu, in his 2009 article. He noted "the government's intention at this early stage is to attract investors in the sector. This proves that the need to protect sensitive water areas from possible and irreversible damage is not yet felt in Ethiopia". Mulugeta Getu, Ethiopian Floriculture and Its Impact on the Environment: Regulation, Supervision and Compliance, *Mizan Law Review* (2009), Vol.3, No.2, pp. 257-258
[127] Interview with Mr. Kifle Alemayehu, *supra* note 117
[128] Environmental Policy of Ethiopia, 1997, Section 3.1 (s) and Section 4.9 (a-c)

Environmental Protection authority.[129] It is commendable to require EIA review as precondition for loan grant, however this may not bring the desired result as companies might have options of obtaining loan from Banks without such arrangement. As a principle EIA need to be conducted at the earliest stage of a project design, but some companies prepared EIA after they constructed greenhouses and some after planting flowers.[130] Therefore, the majority of the companies are simply allowed to cultivate flowers without thorough evaluation of impacts on water resources and other environmental media.

It is discussed in Chapter Four, Section 4.3.3 that it was a requirement under the EIA Proclamation (No. 299/2002)) to produce EIA report before applying for investment license. This procedure was later on reversed by the investment Proclamation (No. 769/2012). Under the late arrangement, licensing agencies (either federal or regional) simply issue permit and notify concerned government institutions for environmental screening.[131] This has been creating problem for follow up as there is weak coordination between government institutions.[132] Wide disparities were found between the number of granted investment permits and those reported to Environmental Protection Authority (EPA).[133] Apart from these, the power of reviewing EIA reports is delegated to concerned sectoral offices and the Ministry of Agriculture is in charge of reviewing reports of floriculture farms.[134] While the Ministry of Water, Irrigation and Electric is entrusted to grant permit for water use and manage the country's water resources, there is no legal mandate to neither consult nor involve the Ministry in review of EIA reports of proposed

[129] Getu, *supra* note 126, pp. 256-257; Mulugeta Getu, Defiance of environmental governance: environmental impact assessment in Ethiopian floriculture industry, *Journal of Environmental Research and Management* (2013), Vol. 4, No. 4, pp. 219-229

[130] Getu, *supra* note 129, p. 224

[131] This is a direct reflection of the government's policy of 'one-stop-shopping' service delivery where a single office issues all licenses (investment, business, land and environmental clearance).

[132] Getu, *supra* note 129, p. 224; Getu notes: "issuance of an investment license before EIA has clearly reduced the incentive of investors to go through the process of impact assessment. Hence, neither the EPA nor the investment agency could find it easy to demand and effectively implement EIA report from investors". Getu, *supra* note 126, p. 256

[133] *Ibid*.

[134] With the delegation of power to sectoral offices, the credibility of the review process has been an issue of discussion. These offices are with mandates other than environmental protection and they might give more weight to their underline duties. See Chapter Four, Section 4.3.3 for further discussion.

floriculture investment projects. Because of these legal and implementation gaps, the Ministry, in some cases, learns about water use plans after construction of greenhouses delaying the timing for action against the decision to grant permit.

III. Duty to Pay Water Charges

Apart from the requirement of permit, there is an obligation to pay water charges for any use of water resources (including discharge of treated wastes to water sources) allowed under the proclamation.[135] The possibility of exemption by the Ministry from paying water charges is indicated in the proclamation though the details are not provided under this or any other legislation. Permit holders shall also pay charges for the discharge or release of wastes into water resources.[136] In practice, however, there is no payment system for water use and water discharge, except for water supplied by the government. [137] Accordingly, surface water (from lakes, rivers and streams) and ground water are used free of charge though this may lead to inappropriate and overutilization of the resource. There is widespread anxiety that introducing water charge might discourage flow of investment and affect the competitiveness of the country in attracting investment.[138]

IV. Conservation and Protection of Water Resources

The Water Resources Management Proclamation provides powers and responsibilities for the Ministry of Water Resources. There are general duties to conserve, protect and secure the proper use of the country's water resources. The Ministry, in collaboration with appropriate public bodies (e.g. Environmental Protection Authority), is empowered to delimit the boundaries of the banks of certain water bodies and prohibit clearing, cutting trees or vegetations and construction of residential houses within the delimited banks of water bodies.[139] It

[135] See Proclamation No. 197/2000, *supra* note 115, Article 21; Regulation No. 115/2005, *supra* note 118, Article 31 & Article 32
[136] Proclamation No. 197/2000, *supra* note 115, Article 22
[137] Interview with Mr. Kifle Alemayehu, *supra* note 117; Interview with Mr. Belachew Niguse, *supra* note 123.
[138] *Ibid*.
[139] Proclamation No. 197/2000, *supra* note 115, Article 25

has the responsibility to prepare and maintain inventory of water resources which includes identification, occurrence, availability, amount, location and quality.[140]

Also the Ministry of Water Resources has various powers under Water Resources Management Regulation (No. 115/2005). It can authorize any person to enter into any land to monitor compliance with the provisions of the proclamation and the regulation as well as conditions attached with the granted permit; inspect conditions relating to quality of water; install or test any instrument; examine substances obtained during a water well drilling; to take a sample of any water or effluent or other substance which may appear to affect water quality.[141] Yet there are limitations of expertise and resources to carry out these responsibilities.[142]

6.2.2. Water Pollution Control

6.2.2.1. Water Pollution and Quality

The pollution of lakes, rivers and groundwater is a serious problem. Water pollution is defined as "harm caused as a result of the pollution of water by using organic or inorganic matter or as a result of a change in the temperature of the water".[143] It affects the quality of water, the use of water by humans and aquatic ecosystems. While the pollutants are diverse, having organic, inorganic and microbial forms, they arise from a variety of sources.[144]

The main pollutants of water in the agriculture sector are organic wastes and agro-chemicals. The discharge of effluents containing fertilizer residues into freshwater systems causes eutrophication, an accelerated growth of plants and algae. This results in a decline in water quality. Toxic materials, such as heavy metals and pesticides, are toxic to humans, animals or plants. Heat is also one form of pollutant as it may affect biological conditions and deoxygenates water.[145] Not only wastes from agricultural sector, but from a number of industries, such as tannery, textile

[140] *Ibid*., Article 10
[141] Regulation No. 115/2005, *supra* note 118, Article 38
[142] Interview with Mr. Kifle Alemayehu, *supra* note 117; Interview with Mr. Belachew Niguse, *supra* note 123.
[143] Proclamation No. 197/2000, *supra* note 115, Article 2(12).
[144] McEldowney & McEldowney, *supra* note 110, p. 268
[145] S. Bell and D. McGillivray (2006), *Environmental Law,* Oxford University Press, New York, p. 702

and paper, pollute water resources. The impact of a pollutant on an organism may be acute, i.e. rapid, obvious, often fatal and normally non-reversible.[146] On the other hand, the impact of long term exposure to low concentration or doses of pollutants, such as pesticide run-off from agricultural land, can be chronic. In this case, the impact might be physiological, lowering the growth or reproduction of an organism.[147] The effect of any pollutant on an organism or community varies depending on the size, temperature, rate of flow, as well as distribution and concentration of the chemical; the length of time that organisms are exposed to the pollutant; environmental transformations of the compound (e.g. chemical reactions and biodegradation), and oxygen content of the receiving water.[148]

The problem of water pollution is complicated as water resources are connected to each other.[149] Rivers and streams are connected to lakes and wetlands while the surface water is connected to the groundwater. As a result, materials entering the water at one point can move to another water body. Precipitation falling on exposed land high in the mountains may carry contaminants into nearby streams, downstream lakes and groundwater.[150] The impact of these contaminants can be felt many kilometres away from their point of origin polluting, for example, a community's drinking water supply. Pollution of water can have substantial impact on water purification cost.[151]

Prevention, monitoring and detection of pollution are essential components of the environmental law regime. One step towards managing water pollution is assessing each water bodies against water quality benchmarks such as the levels of oxygen and nitrates.[152] In the UK, for example, the general state of inland water quality is measured using the General Quality Assessment scheme that has four aspects covering chemical and biological quality, nutrient status and, aesthetic quality.[153]

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[146] McEldowney & McEldowney, *supra* note 110, p. 269
[147] *Ibid*.
[148] *Ibid*., p. 268; Bell & McGillivray, *supra* note 145, p. 702
[149] K. M. Vigil (2003), *Clean Water: An Introduction to Water Quality and Water Pollution Control,* 2nd Ed., Oregon State University Press, Corvallis, p. 8
[150] *Ibid*.
[151] McEldowney & McEldowney, *supra* note 110, p. 268
[152] Bell & McGillivray, *supra* note 145, p. 703
[153] *Ibid.*

Periodical measurement of water quality enables to observe improvements in the regulation of water quality, and provides better picture of the overall effect of pollutants on the ecosystem. In Ethiopia, the responsibilities of the Ministry of Water, Irrigation and Energy are only general. The Proclamation (No. 197/2000) simply requires the Ministry to ensure the study of water resources in terms of development, protection, utilization and control and to carry out inventory of the resources (that includes the identification, occurrence, availability, amount, location and quality).[154]

6.2.2.2. Preventive Measures

The primary responsibility to prevent and control environmental pollution (including water pollution) rests on the Ministry of Environment, Forestry and Climate Change, and regional environmental agencies. The term "environment" is defined to include water resources [155] and, accordingly, water pollution can be governed by Environmental Pollution Control Proclamation No. 300/2002. This proclamation declares that no one shall pollute the environment (including water bodies) and government environmental agencies can take administrative or legal measures against individuals that discharge any pollutant to the environment.[156] It provides the power to request any person engaged in activities that might cause pollution to install sound technology that enables to avoid or reduce pollution.

The Ministry of Environment, Forestry and Climate Change is empowered to request any person that causes any pollution to clean up or pay the cost of cleaning up the polluted environment, in our case lake or river. When an enterprise's activity poses risk to human health or to the environment, the Authority can order closure or relocation.[157] It can assign environmental inspectors that can enter any land or premise at any time, without prior notice or court order, and order the taking of

[154] Proclamation No. 197/2000, *supra* note 115, Article 8(1) (b) and Article 10
[155] The term "environment" is defined as "the totality of all materials whether in their natural state or modified or changed by humans, their external spaces and the interactions which affect their quality or quantity and the welfare of human or other living beings, including but not restricted to, land, atmosphere, weather and climate, water, living things, sound, odour, taste, social factors, and aesthetics" (Environmental Pollution Control Proclamation No. 300/2002, Art. 2(6))
[156] Environmental Pollution Control Proclamation, No. 300/2002, Article 3(1) & Article (2))
[157] *Ibid*., Article 5

corrective measures.[158] It is an offence to obstruct the duties of inspectors, not to comply with their orders, and to discharge any pollutant to the environment.[159] The Ministry, however, is not fully exercising these powers due to limitations in finance, expertise and infrastructure.[160] There are lacks of facilities, such as laboratories, that enable to detect the nature and source of pollution without which it is difficult to identify and take measures against enterprises that pollute the environment. These problems are fuelled by lack of political commitment to enforce laws and a desire to attract investment through deregulation of activities.[161]

6.2.2.3. Discharge Permit

One approach to water pollution control is a requirement of discharge permit that helps to limit on effluents released into rivers and lakes. This is a sort of authorization for the discharge of effluents together with details of procedures and conditions. The responsible organ to grant this permit is the Ministry of Water, Irrigation and Energy or delegated bodies.[162] The procedures and requirements important to obtain the permit are provided in the law. The Water Resources Management Regulation (No. 115/2005), under article 5, declares that a permit to release or discharge waste into water resources will only be granted if the applicant releases or discharges after having treated the pollutant.

The issue what is to be controlled or prevented from entering the water environment is sometimes subject to debate.[163] On one hand, substances which are not inherently toxic or harmful can have damaging impact on water quality, depending on how much is discharged and where such substances are discharged. On the other hand, it is argued that there is usually 'water pollution' only when the water becomes unsuitable for certain uses such as drinking water supply or

[158] *Ibid*., Article 7 & Article 8
[159] *Ibid*., Article 13 & Article 16
[160] Interview with Mrs. Hany Ezedin Mohammed, Monitoring and Control Expert, Ministry of Environment and Forestry and Mr. Wondimneh Abreham, Monitoring and Control Expert, Ministry of Environment and Forestry, 19 August 2015
[161] Getu, *supra* note 126, p. 258
[162] See Regulation No. 115/2005, *supra* note 118, Article 11(1)
[163] Bell & McGillivray, *supra* note 145, p. 704

supporting fish life. The Ethiopian law simply states that a permit will only be granted if the waste is not harmful to human life, animals, plants and any living things.[164] Yet it fails to provide lists of prohibited dangerous substances and chemicals in water discharges. References to such substances can be made from the international conventions to which Ethiopia is a party and national laws. For example, the Stockholm Convention on Persistent Organic Pollutants bans, among others, aldrin, chlordane, DDT, dieldrin, endrin, heptachlor and hexachlorobenzene. Accordingly, granting permits for the discharge of water that likely contain any of these substances is prohibited. The Ministry, in deciding to grant or refuse a permit, is expected to take into consideration effluent and/or stream standards.[165] It is the responsibility of the Ministry of Environment, Forestry and Climate Change to prepare standards for discharge of effluents into water bodies.[166] But such standard is not yet set for the agriculture sector.

The law needs not only just prevent or minimize the entry of pollutants, but ensure a particular quality of water for various purposes. For this purpose, standards are set after studying the characteristics (quality) of the receiving water environment rather than simply focusing on reducing the discharge of certain harmful substances to the environment. Knowing the ecological and chemical status of the receiving water helps to put limits on the lawful discharge of effluents which is fundamental to the system of water pollution control.[167] Unless limits are set, what is discharged may surpass the carrying capacity of the water course. General guidelines for surface water and groundwater standards are set by the Environmental Protection Authority in 2003. [168] But, setting general parameters alone cannot effectively prevent pollution. There are gaps in studying and measuring the quality of each

[164] Proclamation No. 197/2000, *supra* note 115, Article 13(2)
[165] Regulation No. 115/2005, *supra* note 118, Article 11(2)
[166] Proclamation No. 300/2002, Article 6
[167] McEldowney & McEldowney, *supra* note 110, p. 274
[168] The Environmental Protection Authority and the United Nations Industrial Development Organization, Guideline Ambient Environmental Standard for Ethiopia, Prepared under the Ecologically Sustainable Industrial Development Project, US/ETH/99/068/ETHIOPIA , 2003, Addis Ababa, Ethiopia

water body for the purpose of understanding the chemical status of the resource and set specific standards.[169]

Detail procedures to be followed after the receipt of an application for discharge permit are missing in the law. Unlike in the UK's Water Resources Act 1991, there is no obligation under the law to publish notice of discharge. This Act requires, among others, the publication of notice in a local newspaper in the vicinity of where the discharge is intended to take place and informing relevant local authority about details of the intended discharges.[170] These procedures are particularly followed in situations where the discharge might result in major change in the flow of the receiving water or in water quality that may affect future use.[171] Regardless of the nature and consequence of discharge, neither the government authority empowered to grant discharge permit in Ethiopia nor is the applicant required to follow these steps. However, introducing similar procedures to the legal regime might help to make the system participatory and avoid some unforeseen consequences.

A person granted with a permit to discharge treated waste water is required to fulfil some obligations. These include the duty to install and use waste treatment methods; to discharge only the type and volume of treated waste permitted; to allow the Ministry to take sample from the treated waste at any time.[172] In relation to these, maintaining permanent records of discharges is important though there is no explicit requirement in the proclamation or regulation. Attaching detail conditions with the permit about matters such as the place at which the discharge may be made, the nature, volume, composition and rate of discharge, the sitting and design of the outlet, and the steps to be taken to minimize the discharge may also have paramount importance. Not only these but also that monitoring through, for example, regular review of the discharge, is necessary to make decisions about renewal, revocation and suspension. Nevertheless, details about monitoring and follow up are not provided in the law.

[169] Interview with Mr. Belachew Niguse, *supra* note 123; Getu, *supra* note 126
[170] McEldowney & McEldowney, *supra* note 110, pp. 276-277
[171] *Ibid*.
[172] Regulation No. 115/2005, *supra* note 118, Article 12

The law provides the power to revoke or suspend a waste discharge permit.[173] Failure to comply with the obligations to install and use waste treatment methods, discharging the waste different in type and volume from the one permitted, preventing the Ministry from taking sample from the treated waste can lead to revocation or suspension of permit. Additional grounds are failures to comply with the terms and conditions prescribed in the permit and indications that the permit was obtained by presenting false evidence. All these grounds relate, in one way or another, with fault on the part of the permit holder. Modification, revocation or suspension of the permit may be required for environmental reasons, such as increase in flow of the receiving water and unforeseen impact on water quality, though these are omitted from the list.

A permit system can contribute in various ways to bring point sources of water pollution under control.[174] These sources of pollution are 'clearly identifiable' discharged directly into the water environment and can have hazardous impact on the ecosystem or human health.[175] There is no well-established discharge permit system in Ethiopia. The law faces problem to control non-point source of water pollution (diffuse pollutants), such as agricultural run-off. These pollutants can easily be washed from one area of land to another and may accumulate in water bodies, making difficult to attribute the use of pollutants to a particular individual. Also some pollutants may take several years before they contaminate in a river or organisms. The use of combined legal and other methods is suggested to control pollutions arising from diffuse sources.[176] For example, in the effort to change agricultural land management practices (which is important to minimize adverse impacts on water quality), controlling the use of fertilizers and pesticides or introducing schemes that provide financial supports or benefits for those farmers that only have good agricultural practices might be effective. Therefore, in order to regulate water pollution from the floriculture industry, it is important to note that the discharge permit system can contribute to control point-source pollutants,

[173] *Ibid*., Article 13
[174] Bell & McGillivray, *supra* note 145, pp. 748-749
[175] McEldowney & McEldowney, *supra* note 110, p. 273
[176] Bell & McGillivray, *supra* note 145, pp. 748-749

while it is necessary to craft other control mechanisms for non-point source pollutants.

6.2.2.4. Criminal Offences for Water Pollution

Acts committed to harm ecological systems or the normal functioning of such entities constitute criminal offences and are punishable by law. Punishments are stipulated for offences related to pollution under the Federal Criminal Code of Ethiopia.[177] Article 519 of the Code provides that the act of discharging pollutants into the environment, in contravention of the relevant environmental laws, is punishable with fine (not exceeding ten thousand Birr) or rigorous imprisonment (not exceeding ten years). If such pollution results in serious consequences to the health or life of persons, or to the environment, the term of imprisonment may extend to ten years.

How far the criminal punishment system is effective in terms of holding companies, and also natural persons, liable for environmental pollution requires in-depth investigation. A research indicates that there are problems within the system mainly related to the law enforcement organs.[178] There are lack of awareness about environmental crimes among the public, law enforcement agencies and the police. Few complaints are made before Environmental Protection Authority on which the Authority appoints investigators, but most of these failed to end with prosecution for unclear reasons. Even the few cases that made to trail have faced considerable challenges during the litigation process because of limited knowledge about environmental laws among legal professionals and judges. According to the researchers, there were instances in which offenders were prosecuted with other laws (e.g. trespass) while the cases were pure environmental offences.[179]

[177] The following are also criminal offences under the criminal code: propagation of an agricultural or forest parasite, contamination of water, contamination of pastureland, mismanagement of hazardous wastes and acts contrary to the environmental impact assessment. Criminal Code of the Federal Democratic Republic of Ethiopia, Proclamation No.414/2004

[178] R. Mwebaza, P. N. Mwanika and W. S. Wonndemagegnehu (2009), *Environmental Crimes in Ethiopia,* Situation Report, Institute for Security Study, Pretoria, South Africa, https://www.issafrica.org/uploads/EnvironCrimesEthioJul08.pdf , accessed on 24 May 2016

[179] *Ibid*.

6.2.3. International Law and Water Resources

In relation to water resources, the focus of international law has mostly been on marine water rather than water quality at national level.[180] There are also some treaties on international watercourses though these are not universally ratified instruments. Thus, the quality of inland waters is mainly governed by environmental law regimes at the national level.

6.3. Aquatic Life and Wetlands Protection

Biodiversity and habitats are valued and conserved for various reasons.[181] One reason is they provide biological resources such as food, pharmaceutical and other material values that support life. They contribute to the maintenance of the biosphere that supports human and other life. Apart from these reasons, biodiversity is maintained for non-scientific reasons of ethical, cultural, spiritual or aesthetic values.[182] However, human activities, such as direct harvesting of species, introduction of alien species, habitat destruction and various forms of habitat degradation (including environmental pollution) pose serious threat to biodiversity. The destruction and loss of habitats and species bring ecological consequences. [183]

States employ different regulatory techniques to conserve species and their habitat. These include: establishing protected areas; prohibiting and/or regulating the taking of particular species; regulating the exploitation of species by limiting utilization to that which is 'rational', or 'optimal' or 'maximal'; prohibiting and/or regulating international trade in species; managing habitats; prohibiting methods or means of taking; and prohibiting on the introduction of new or alien species.[184] Sands notes that legal efforts to address loss of biodiversity need to focus not only on the species and habitats, but also on the root causes that lead to the

[180] Bell & McGillivray, *supra* note 145, p. 709
[181] Ibid., pp. 798-799; See also P. Sands (2003), *Principles of International Environmental Law,* 2nd Ed, Cambridge University Press, Cambridge Sands, pp. 499-500
[182] Sands, *supra* note 181, p. 500
[183] These affect the ability of ecosystems to purify water, regenerate soil, protect watersheds, regulate temperature, recycle nutrients and waste, and maintain the atmosphere. The impact may extend to economic, medical and agricultural losses and have profound moral and aesthetic implications. *Ibid*., pp. 499-500
[184] *Ibid*., p. 503

destruction.[185] In other words, effective conservation of species and habitats depends on responses to other environmental threats, such as pollution and climate change. Measures taken to protect the atmosphere and water resources and to address hazardous wastes are fundamentally important for biodiversity protection.[186] These issues were primary focuses in the preceding parts of this chapter and Chapter Five; this section looks at the laws that aim specifically to protect plants, animals and natural habitat.

6.3.1. Major Causes of Biodiversity Loss

The National Biodiversity Strategy and Action Plan, which was introduced in 2005, asserts that though Ethiopia is endowed with diverse biological wealth of plants, animals and microbial species, the attention given to the conservation and sustainable use of the resources has been inadequate.[187] The biological resources are declining at accelerated rate due to various contributory factors. The main once include population growth, unsustainable level of harvest, an economic system that fails to value the environment, low-level of awareness about ecosystem, and under-investment in biodiversity management. Population pressure is leading to the conversion of natural forests, woodlands and wetlands ecosystems to agriculture and unsustainable utilization of natural resources. The problem is accompanied by poor agricultural productivity, practices that cause soil erosion and inability to maintain soil fertility. In addition to this, the biodiversity in Ethiopia is affected by climate change that increases desertification and flooding.

Also weaknesses are in government policies and legislative measures that contribute to biodiversity loss. The document clearly states that "decisions to exploit natural resources in Ethiopia are often taken without taking full account of the social costs of habitat losses or extinction, nor shared equitably. Conversely, the social benefits of conserving biodiversity are rarely taken into account".[188] The land tenure system is weak enough to allow open access to a large proportion of forests

[185] *Ibid*., p. 500
[186] *Ibid*., p. 502
[187] The National Biodiversity Strategy and Action Plan, Ethiopia, 2005; See also Mwebaza, *et al*, *supra* note 182, pp. 4-5
[188] The National Biodiversity Strategy and Action Plan, *supra* note 187, p. 36

and wild lands, which are ineffectively governed by the applicable property law regimes. This leads to the destruction and overutilization of the resources. Apart from this, there is lack of political will to enforce legislations, weak management, and poor cooperation between government agencies. Ten year has passed since the Strategy and Action Plan was issued, but the environmental problems seem to continue due to weak environmental laws, implementation and follow up.[189]

The conservation and sustainable use of biodiversity requires the establishment effective management and regulatory system. In this regard, there are ranges of measures that states need to take. The National Biodiversity Strategy and Action Plan (2005) suggests that policies and plans which promote these objectives need to be adopted and integrated into sectoral plans and programmes. This should be accompanied by an effective legal framework to implement national policies and conventions ratified by the country.[190]

6.3.2. Degradation of Wetland Resources

Ethiopia is endowed with enormous wetland [191] resources that play significant ecological, economic and socio-cultural roles.[192] The major types of wetlands in Ethiopia include swamps, marshy wetlands, flood plains, natural and human-made lakes, peaty wetlands and swamp forest wetlands.[193] Only wetlands that are associated with coastal areas are absent as the country is land locked. These resources provide life-supporting services including water supplies for humans and livestock, fish supplies, raw materials such as reed and papyrus, medicinal plants, and food subsistence from wetland agriculture. Wetland fishery, for example,

[189] E. César and A. Ekbom (2013), *Ethiopia Environmental and Climate Change policy brief,* Sida's Helpdesk for Environment and Climate Change, www.sidaenvironmenthelpdesk.se , accessed on 14 February 2015

[190] One form of legislative response could be introducing a system of incentives to promote biodiversity conservation and disincentive to discourage activities which deplete biodiversity. Enforcement of biodiversity-related laws can be enhanced through, for example, strengthening the capacity of law enforcement organs and creating enabling environment for civil society that advocate biodiversity conservation.

[191] For definition of Wetlands reference can be made to Chapter Two, Section 2.2.3.

[192] A. Hailu (2007), *Potential Wetland Resources of Ethiopia: Use and Threats,* Forum for Environment, Addis Ababa, pp. 1-11; S. Deribe (2007), *The Ramsar Convention on Wetlands and the Status of Ethiopia,* Forum for Environment, Addis Ababa, pp. 13-16

[193] *Ibid*.

constitutes a very important sector of local economy and a means for livelihood for mainly people in the Rift Valley and around Lake Tana. Various forms of recession agriculture are also practiced on Wetlands along the shores of Lake Tana and major rivers of the country. Wetlands provide ecological functions by maintaining the hydrological cycle, controlling flood and erosion as well as offering habitat for biodiversity. Particularly, the Rift Valley lakes and wetlands support thousands of birds and harbours migratory, species, including some globally endangered ones.[194] Around 25% of the country's bird species (about 861 species) depend on Wetlands.[195]

However, the wetlands are undergoing through degradation and change of characteristics because of various contributory factors.[196] The immediate threat comes from unregulated and unwise resource utilization in the form of drainage to grow food crops, livestock grazing and resource extraction. For years, wetlands have been used to meet various interests and needs of the local community without paying attention to depletion.[197] As indicated earlier in this chapter, recent treats are related to expansion of investment, including floriculture, within wetland ecosystems.

In Ethiopia, there is no formulated wetland policy, strategy and program. While the Environmental Policy of the country provides some measures for conservation of biodiversity, it literary overlooked the issue of wetlands protection. Some government policies that aimed to increase local food productivity are having negative consequences on the resources. A good example is the introduction of rice cultivation in Fogera as indication that priority is given for food production for immediate needs over sustainable utilization of the resource.[198] This can be one form of challenge countries, like Ethiopia, face in the efforts to achieve the two interests: natural resources conservation and the need for food security. Also

[194] Hailu, *supra* note 192, p. 4
[195] *Ibid*.
[196] *Ibid*.; Deribe, *supra* note 1962
[197] Hailu, *supra* note 192, p. 6
[198] *Ibid*., p. 8

Fogera wetland is among the lands identified for flower production.[199] In addition to these, lack of institutional setup that controls and regulates proper utilization and management of the resource and low level of awareness about wetlands have been leading to degradation of the resources.[200]

6.3.3. Relevant Policies

The country has put in place policies that promote biodiversity conservation. The main ones are the Federal Environmental Policy and the National Biodiversity Conservation and Research Policy.

I. Environmental Policy of Ethiopia

The Environmental Policy of Ethiopia addresses a wide range of policy issues.[201] It gives recognition to the right of every person to live in a healthy environment. It encourages, in any effort to balance economic growth and environmental protection interests, impacts on the environment and ecosystem need to be minimized. In any development plan that the country pursues, the full environmental and social costs need to be internalized. The policy requires the integration of natural resource and environmental management into all sectors and levels of organizations. Apart from these, it requires the maintenance and preservation of all species, including animals, plants and other micro-organisms for the use of the present and future generation.

Section 3.3 of the policy is particularly focused on biodiversity conservation. Entitled "genetic, species and ecosystem biodiversity", it incorporates a number of policy elements. It promotes *in-situ* conservation (i.e. conservation in a natural reserve, farmer's field, etc.) as primary measure and *ex situ* conservation (i.e. conservation, for example in gene banks and ranches) as a complement. It also promotes the integration of biodiversity conservation into land use plans and sustainable agriculture and pastoral production strategies.

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[199] See Section 6.1.1.2 above
[200] Hailu, *supra* note 192, p.8
[201] Environmental Policy of Ethiopia, *supra* note 128, Section 2.3.

In addition to directly promoting the conservation and sustainable utilization of biodiversity, the policy document recognizes the need for rehabilitation and protection of natural ecosystems, particularly wetlands and upstream forests.[202] It demands detailed ecological studies and environmental impact assessment for any proposed introduction of exotic species into water ecosystems, and for water conservation, development and management projects. This is important to maintain the ecological balance and quality of water resources.

II. The National Biodiversity Conservation and Research policy

The National Biodiversity Conservation and Research policy, adopted in 1998, aims to provide guidance towards the effective conservation, rational development and sustainable utilization of the country's biodiversity. Some of the objectives of the policy include:

- ensuring that the genetic resources and essential ecosystems of the country are conserved, developed and sustainably utilized;
- asserting national sovereignty of the country over its genetic resources;
- enriching the country's genetic resources through introduction, repatriation and restoration;
- building national scientific capacity to collect, conserve, evaluate and utilize the country's biodiversity; and
- integrating biodiversity conservation with sectoral and cross-sectoral strategies and programs.

6.3.4. National Legislation

Legislation is required to give binding effect for policy issues incorporated in the above discussed documents. Yet neither a comprehensive biodiversity law that inclusively address conservation and management matters nor a legislation that specifically concerns aquatic life (fish, bird species, etc) exists. The same is true for wetlands protection. Of course, there are laws related to the conservation of the different components of biodiversity, such as Forest Development, Conservation

[202] *Ibid*., Section 3.4

and Utilization Proclamation (No. 542/2007) and Development, Conservation and Utilization of Wildlife Proclamation (No. 541/2007). The former governs the management and ownership of forest resources and protects indigenous natural trees from any damaging human activity. The latter aims to achieve planned and appropriate utilization of wildlife, provides protection measures and governs how national parks are administered. The country also enacted Bio safety proclamation (No, 655/2009) which is concerned with the making, use, import and transportation of genetically modified organisms. However, these legislations are not directly related to the issues in this chapter.

6.3.5. International law on Biodiversity and Wetlands Protection

International law for the conservation of biodiversity is "relatively well developed".[203] There are treaties that are either potentially applicable to the protection of all species in the world or applicable to particular habitat or species types at the regional or global level. In the first category are the 1973 Convention on International Trade in Endangered Species (CITES) and the 1992 Biodiversity Convention. The others are international regulatory efforts that promote, for example, the conservation of wetlands, forests, plants, marine living resources, birds or migratory species.[204] Also there are regional agreements that are applicable to all species or habitats within a particular region.

International agreements, regardless of their nature or application, employ creative regulatory techniques in the effort to maintain or protect biodiversity.[205] Some of these include: establishing protected area; regulating the taking of particular species; compliance with general standards limiting utilization to that which is 'rational', or 'optimal' or 'maximal'; regulation of international trade in species; management of habitat and ecosystem; prohibit on methods or means of taking; and prohibit the introduction of new or alien species. As pointed out from the outset the environmental threat from the floriculture industry can be distraction of

[203] Sands, *supra* note 181, p. 501
[204] *Ibid*., pp. 502-503
[205] *Ibid*., p. 503

habitat (wetlands or water bodies) and/or direct impact on particular species, which may extend to extinction of species, resulting from huge application of agro-chemicals. Accordingly, it is only some of the regulatory techniques mentioned above play role in tackling the problem.

The following Sections discuss two international conventions that are directly related to the discussions in this chapter: the Biodiversity Convention and the Ramsar Convention. The former is ratified by Ethiopia through Biological Diversity Convention Ratification Proclamation (No. 98/1994). Though not ratified by Ethiopia, the Ramsar Convention, the only international environmental convention dealing with wetland ecosystems, is discussed since it can provide lessons for national level actions for wetlands conservation.

6.3.5.1. The Convention on Biodiversity

The Convention on Biodiversity was negotiated under the auspices of UNEP and signed in 1992. It declares, in its Preamble, that the conservation of biological diversity [206] is "a common concern of humankind". It affirms that States have "sovereign rights over their own biological resources" and are "responsible for conserving their biological diversity and for using their biological resources in a sustainable manner". Yet there are concerns that "biodiversity is being significantly reduced by certain human activities". The Convention has three objectives (Art. 1): the conservation of biological diversity (1), the sustainable use of its components (2), and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources (3).

Several commitments are included in the Convention. One of this is the requirement to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity.[207] Alternatively, States need to adopt existing strategies, plans or programmes in order to reflect properly

[206] 'Biological diversity' is defined in Art. 2 as 'the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems'. The Convention on Biological Diversity, United Nations, 1992

[207] *Ibid*., Article 6

the measures set out in the Convention. Moreover, the Convention demands State Parties to integrate, wherever possible and appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies. As a State Party to the Convention, Ethiopia, so far developed national strategy and Action plan, discussed in Section 6.3.3 above, that restates and reaffirms the specific obligations.

The Convention provides more specific measures that each Party is required to take.[208] These include the duty: to identify components of biodiversity important for conservation and sustainable use; to monitor those component by paying particular attention to those that require urgent measure and those which offer greatest potential for sustainable use; and to identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity and monitor their effects. This last measure is particularly important, because it is an important step towards regulating or managing the adverse effect of the identified process or activity.

The measures that the Convention requires, under Article 7, if followed, can bring valuable results in biodiversity conservation. Based on this requirement, Ethiopia needs to identify which biodiversity is important for conservation and take appropriate measures not to affect the resource while planning development activities. The biological diversity at the areas where flower companies are established (some are adjacent to water bodies and wetlands as discussed in Section 6.2) requires attention. Country wide studies and assessments can also help to identify the biodiversity worth conservation.[209]

The Convention requires additional policy measures which are important for biodiversity conservation. These are: the requirement to integrate the need for conservation and sustainable use of biological resources into national decision-

[208] *Ibid*., Article 7

[209] This can be done using indicative lists for identification and monitoring that are provided in Annex I of the Convention. This process will be followed by the management of companies' activities that threaten the biodiversity or species. As Article 11 of the Convention states, the country can adopt economically or socially sound measures that act as incentive for the conservation and sustainable use of components of biodiversity.

making;[210] adopt measures to avoid or minimize adverse impacts on biodiversity;[211] raise awareness about the importance of the conservation of biodiversity;[212] and introduce appropriate procedures that require environmental impact assessment of proposed projects that are likely to have significant adverse impact on biodiversity, and ensure those impacts are minimized.[213] All these measures can be brought into application at national level and in relation to floriculture.

6.3.5.2. The Ramsar Convention on Wetlands

The Ramsar Convention was adopted in 1971 (entered into force in 1975) with the objective to ensure the conservation and wise use of wetlands.[214] The Convention, in its preamble, recognizes that wetlands have fundamental ecological functions as regulators of water regimes and as habitats supporting flora and fauna, especially waterfowl, and constitute a resource of great economic, cultural, scientific and recreational values whose loss can be irreversible. It sets the message that "the conservation of wetlands and their flora and fauna can be ensured by combining far-sighted national policies with coordinated international action".[215]

Contracting Parties commit to four major responsibilities. The first obligation under the Convention is for a Party to designate suitable wetlands within its territory for inclusion in a List of Wetlands of International Importance and promote their conservation.[216] The selection should be made based on the account of their international significance in terms of ecology, botany, zoology, limnology or hydrology. The boundaries of each wetland shall be clearly described and delimited on a map. Second, there is a general obligation for Contracting Parties to include wetland conservation consideration in their national land-use planning. The

[210] *Ibid*., Article 10 (a)
[211] *Ibid*., Article 10(b)
[212] *Ibid*., Article 13
[213] *Ibid*., Article 14
[214] The Convention defines Wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters" (Art. 1.1). Wetlands may also incorporate "riparian and costal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands" (Art. 2). The Ramsar Convention on Wetlands, United Nations, 1971
[215] *Ibid.,* the preamble
[216] *Ibid.,* Article 2

commitments are formulating and implementing this planning so as to promote the wise use of wetlands in their territory.[217] This means the resources need to be sustainably utilized for the benefit of human beings in a way compatible with the maintenance of the natural properties of the ecosystem. Third, each Contracting Party is required to promote the conservation of wetlands and waterfowl by establishing nature reserve on wetlands, whether they are included in the List or not.[218]

There are some privileges and benefits that States acquire by becoming contracting parties.[219] Ratification of the Convention entails endorsement of basic principles, and development of national level policies and legislations. These are basic steps in any country's effort to conserve and use its wetland resources in the quest for sustainable development. A State can get opportunity to its voice heard in intergovernmental forum on the conservation and wise use of wetlands and bring increased publicity for the wetlands designated for the List of Wetlands of International Importance. There will be increased possibility and access to international support (i.e. expert advice and financial) for the conservation and management of wetlands. It creates an opportunity to share responsibility among member countries and strengthen the capacity of States to reduce wetland degradation. Thus, ratifying the Ramsar Convention will be a good step for Ethiopia towards conservation and wise use of wetlands.

6.4. Conclusion

This chapter addressed two major issues in relation to regulation of flower cultivation impacts on the environment. First, with the case studies (give dates of

[217] *Ibid.,* Article 3

[218] *Ibid*., Article 4. Further interpretation for responsibilities was provided by Contracting Parties in Resolution 5.1 (1993) of the Conference of the Parties. These include: to formulate and implement planning so as to promote the wise use of wetlands; to adopt and apply the *Guidelines for implementation of the wise use concept*, notably as regards elaboration and implementation of national wetland policies; to make environmental impact assessments before transformations of wetlands; to establish nature reserves on wetlands and provide adequately for their conservation; and to make national wetland inventories which will identify major sites for wetland biodiversity. Ramsar Convention Secretariat (2013), *The Ramsar Convention Manual: A Guide to the Convention on Wetlands (Ramsar, Iran, 1971), 6th Edition,* Ramsar Convention Secretariat, p. 15

[219] Deribe, *supra* note 192

when the studies were undertaken) of two major lakes- Lake Ziway and Lake Tana, it demonstrated the threat that commercial flower cultivation is posing on water resources. The lakes are selected for the case studies because of their ecological significances and their exposure to degradation due to establishment of floricultural companies on their shores. The study demonstrated that while the lakes are significantly important in providing economical, social and environmental benefits in numerous ways, the quality and quantity of surface water is seriously deteriorating due to different factor. Lack of well-functioning regulatory system has been leading to overexploitation of water and pollution. It explained that the establishment of floricultural companies adjacent to the lakes aggravates the problem as huge amount of water is extracted for flower production and there is risk of agro-chemical contamination due to release of untreated effluents and runoff. These are particularly witnessed on Lake Ziway where pipelines are laid to each greenhouse from the lake and effluents are drained to it using water-way from greenhouses. It was only feasible to use secondary data from empirical researches for the case studies since it was not possible to undertake field research due to limited time-scale of the research. The groundwater resources of the country are also under threat mainly because of large scale abstraction by companies concentrated in one area without detailed assessment of the resources.

Thorough investigation into the regulation of water resources in Ethiopia reveals that basic rights in relation to water are guaranteed. The Water Resource Management Policy and the Water Resource Management Strategy demand the introduction of appropriate mechanisms to protect water resources, which are commonly owned by the people. These include: formulation of standards, controlling discharges and effluents into watercourses and assessment of groundwater in terms of their spatial and temporal occurrence. The Constitution guarantees the right to live in a clean and healthy environment. The Water Resource Management Proclamation (No. 197/2000) and the Water Resource Management Regulation (No. 115/2005) also provide detail account to water related issue. They especially introduced a permit system for water use and water discharge. They also require users to pay changes for any use of water resources,

including discharge of treated wastes to water courses. Internationally polluting water bodies constitutes criminal offence under the Criminal law of Ethiopia though there is no effectively functioning system to hold companies liable for the act.

The legislation, if strictly implemented, can play significant role in water resource management. However, detail requirements are missing in relation to some requirements such as procedures to be followed after receipt of an application for discharge permit. There is also gap to regulate non-point source of water pollution (diffuse pollutants), such as agricultural run-off as these cannot be regulated through discharge permit. Therefore, it is important to introduce a different form of regulatory framework to control the use of agro-chemicals. The main problem lies on weak implementation of basic principles and requirements of legislations. This is particularly true in relation to water use permit, environmental impact assessment and discharge permit.

Due to lack of well-established system, permits are simply granted without thorough investigation of environmental impacts contrary to that stipulated in the law. One of the main obstacles is deep rooted attitude in government institutions that denying water use permit for applicants might amount to obstruction to the country's interest to enhance investment. Investors apply for water use permit after they are issued with investment license and this created wrong impression and lead institutions to believe that denying the permit will impede investment. Besides not all floricultural investment projects went through EIA; the majority of the companies are simply allowed to cultivate flowers without thorough evaluation of impacts on water resources and other environmental media. In addition, there is no payment system for water use and water discharge, except for water supplied by the government. Accordingly, surface water (from lakes, rivers and streams) and ground water are used free of charge though this may lead to inappropriate and overutilization of the resource.

Other limitations identified in this chapter relate to standards. Though the law requires standards for effluents, such standards for discharges from the agricultural sector are not set yet. General guidelines for surface water and groundwater

standards are laid down by the Environmental Protection Authority in 2003. But, there are gaps in studying and measuring the quality of each water body, which is important to understand the status of the resource and set specific standards. Apart from these, government institutions responsible to administer water resources and protect water resources from pollution are with financial constraints and limited human resource capabilities. There is weak political will to enforce legislations which is deep-rooted in the belief that strict environmental regulation contravenes with the country's interest to enhance investment. Also it can be said that the rapid growth in the flower industry placed unprecedented demands on regulatory systems in Ethiopia. This may also be the reason why the problems of water loss and contamination have not been easy to predict or prevent.

The second issue addressed in this chapter is the regulation of wetlands and aquatic life. The chapter indicated that Ethiopia is endowed with enormous wetlands, but these are degrading due to unwise utilization and in some cases contradicting government policies. Recent threats are emerging with the expansion of floriculture within wetland ecosystems. This is evidenced by the case studies on Lake Ziway and Lake Tana, where flower production has been carried out on the shores by destructing the beneficial use of the resources as habitat. Untreated effluents and run-off with agro-chemicals from floriculture establishments is a threat to biodiversity and aquatic life. In Ethiopia, there is no formulated wetland policy and strategy. The country has not ratified the Ramsar Convention that could have leaded the country to develop national level policies and legislations, and have access to international support for the conservation of the resources. In relation to biodiversity, basic principles are incorporated in the Environmental Policy of Ethiopia and the National Biodiversity Conservation and Research Policy. But neither a comprehensive biodiversity law that inclusively address conservation matters nor a legislation that specifically concerns aquatic life exists. As a party to the Convention on Biodiversity, however, Ethiopia is required to identify and monitor components of biodiversity important for conservation. It is also an obligation to identify processes and activities that have or likely to have adverse impacts on sustainable use of biodiversity.

Chapter Seven: Flower Production and Soil: Impacts and Regulations

Introduction

We turn to the question of the effects of flower production on soil quality and more generally in terms of chemical contamination. Already it was noted in Chapters Two and Five that in flower production, chemical pesticides are directly applied to the soil to control soil-born pests and pathogens and sprayed during the entire period of plant growth to control pest outbreak. During these processes, pesticide residues can have way to water bodies and the soil causing deterioration to the resources. The preceding chapter discussed how pesticides can affect water resources. Beginning with a general discussion of soil degradation, the present chapter reviews consequent soil related impacts of chemical pesticides use in the floriculture industry. It indicates alternatives and measures in the eco-friendly flower production, and the limitations in developing countries to adopt the methods.

In Ethiopia, the main cause for soil degradation has been rain erosion associated with massive deforestation that has been carried out to satisfy the needs of the growing population. As a result of these widespread problem, the physical structure, nutrient status and organic content of the soil, mainly in highland areas, is severely affected. Recent concerns have been emerging with consecutive policies of the government to increase agricultural productivity and the rise of the floriculture sector. Pesticides and other agro-chemicals are now widely used posing serious threat on soil fertility and the ecology, as a whole. This chapter, is specifically focused on the impact of flower cultivation on the soil, demonstrates that pesticides, like methyl bromide, used to disinfest the soil can rigorously cause degradation. Hydroponic based production and others, such as steam sterilisation and soil solarisation, are alternatives to chemical based soil disinfestations and protect the soil against contamination. However, the alternatives are not widely used in Ethiopia due to constraints in finance and expertise. Particularly, in relation to hydroponics, initial investment costs, drained water recycling expenses and costs

incurred to employ expertise to run the system are discouraging factors. The majority of the flowers produced in Ethiopia are thus soil based. The application of chemical pesticides directly to the soil coupled with weak regulation can inevitable lead to soil pollution.

Pesticide sprayed on the plant to control photogenes can also pollute the soil missing its target. Where there is no effective mechanism to threat effluents, pesticide and fertiliser residues can deteriorate soil quality. Though few, studies suggest that the influence of floriculture effluent on soil quality is high in Ethiopia. The chapter indicates that the use of chemical pesticides and associated impacts on human health and the environment can be minimized if biological pest control mechanisms are widely introduced. This involves the controlled release of insects or animals that consume pests. The chapter highlights the initiatives taken by floricultural companies to introduce the method and the acquired advantages in reducing chemical pesticides consumptions. Nevertheless, like in the case of hydroponics, the sustainable and industry wide implementation of the method is constrained due to limitations in finance and expertise. All companies in the industry are not with equal capabilities to respond to the challenges accompanied to biological pest control methods. However, considering the contributory roles of hydroponics and biological pest control methods in protecting the soil against degradation, the chapter underlines on the importance of scaling up the initiatives that began in some flower farms to the industry wide. It suggests that there should be incentive based government support and regulatory requirements to render the methods mandatory in future projects and extensions.

Finally, the chapter indicates that national legislative frameworks and international agreements fail to specifically address the issue of soil degradation. Though legislations concerning waste disposal, pollution and pesticide regulation can somehow extend protection for soil by managing activities that directly lead to the problem, the protections they extend for soil are not adequate. The same is true for international agreements as there are no legally binding instruments that have, as their primary aim, specific measures to conserve, improve and rehabilitate soil, and prevent soil degradation. Yet well designed legislative frameworks are required to

lay the foundations for sustainable use of soil and there by prevent or minimize the risks of soil degradation.

7.1. Soil and Soil Degradation

Soil is composed from mineral particles, organic matter, water, air and living organisms. It is the basis of virtually all territorial life; inherent part and foundation of biological diversity.[1] As Hannam & Boer note "any alteration of soil processes can lead to changes in the function of ecosystems … many environmental problems, which become apparent in flora and fauna may originate from changes in the soil".[2] Human and many other forms of life that exist on earth depend, on one way or another, on the soil. Soil has fundamental role in food and other biomass production, storage, filtration and transformation of many substances including water, carbon and nitrogen.[3] Thus, it should be acknowledged that the soil environment is "essential to the sustainability of all terrestrial life, and must therefore be legally protected and sustainably managed at the highest level of environmental significance".[4]

Though soil has a wide range of function and vital roles, it is degrading increasingly throughout the world.[5] This is "a loss or reduction of soil functions or soil uses, thus lowering the potential capability of the soil to produce ecosystem services".[6] It includes physical, chemical, and biological deterioration, including loss of organic matter, decline in soil fertility, erosion and pollution. Soil degradation extremely affects future use and agricultural productivity depending on the extent of degradation which ranges from light to extreme.[7] In the case of light degradation there are signs of degradation, but the soil can be restored using good conservation

[1] I. Hannam & B. Boer (2004), *Drafting Legislation for Sustainable Soils: A Guid,* IUCN- The World Conservation Unit, Gland and Switzerland.
[2] *Ibid*., p. 3
[3] D. Shelton & A. Kiss (2005), *Judicial handbook on Environmental Law,* UNEP, Nairobi, p. 86
[4] Hannam & Boer, *supra* note 1, p. 19
[5] *Ibid*., I. Hannam & B. Boer (2002), *Legal and Institutional Frameworks for Sustainable Soils: A Preliminary Report,* IUCN, Gland and Cambridge
[6] Hannam & Boer, *supra* note 1, p. 3
[7] P. Sands (2003), *Principles of International Environmental Law,* 2nd ed, Cambridge University Press, Cambridge, p. 555

practices. The degradation can be moderate which means that the agricultural use of the soil continued but with greatly reduced productivity. Sometimes the soil becomes unsuitable for agriculture, but restoration might be possible at a high cost. This kind of degradation is considered severe. Extreme degradation refers to the situation where restoration is absolutely impossible.

The causes of soil degradation are various.[8] Inappropriate management of forests and agricultural lands via intensive and environmentally unsound methods causes erosion. Soil degradation can result from physical deterioration caused by agricultural activities, deforestation, over-exploitation, industrial activities, and overgrazing. Apart from these, overuse of soil depletes its nutrients. It can also result from chemical deterioration due to salinisation, acidification and pollution. Heavy metals and organic toxic substances, including fertilizers and pesticides, pose serious problems on soil.

Also in Ethiopia soil degradation is a serious problem caused by interaction of many factors.[9] The underlying causes are mainly associated with population growth and deforestation.[10] With rapidly growing population, forest resources have been extensively cleared to satisfy the needs for additional cultivable land, fuel-wood and construction materials. About 66 % of the country was originally covered with forests and woodlands, but this shrink to 2.2 % in 2000.[11] Deforestation exposed the soil for water erosion which affects nutrient status, organic matter content and physical structure.[12] Soil erosion is said to be high on cultivated land with average

[8] *Ibid*., p. 555; Shelton & Kiss, *supra* note 2, p. 86; Hannam & Boer, *supra* note 1
[9] Temesgen Gashaw, Amare Bantider and Hagos G/Silassie, Land Degradation in Ethiopia: Causes, Impacts and Rehabilitation Techniques, *Journal of Environment and Earth Science* (2014), Vol. 4, No. 9, pp. 98-104
[10] Paulos Dubale, Soil and Water Resources and Degradation Factors Affecting Productivity in Ethiopian Highland Agro-Ecosystems, *Northeast African Studies* (2001), Vo. 8, No. 1, pp. 27-51; Leonard Berry (2003), "Land degradation in Ethiopia: its impact and extent" in L. Berry, J. Olson and D. Campbell (Eds), *Assessing the extent, cost and impact of land degradation at the national level: findings and lessons learned from seven pilot case studies*, Commissioned by global mechanism with support from the World Bank.
[11] Berry, *supra* note 10
[12] Mahmud Yesuf, *et al* (2005), *Cost of Land Degradation in Ethiopia: A Critical Review of Past Studies*, Research Paper, Environmental Economics Policy Forum for Ethiopia, www.efdinitiative.org , accessed on 28 April 2016

annual loss of 42 tons/ha, compared with 5 tons/ha from pastures.[13] In the mid-1980's 50% of the highland area was already eroded and over 2 million ha of farm lands reached the "point of no return".[14] The nutrient depletion rate is estimated to be 30kg/ha of nitrogen and 15-20kg/ha of phosphorous.[15] Soil loss and deterioration in fertility has been reducing the country's agricultural productivity. In addition to these, past agricultural practices, such as repeated ploughing before plantation and continues cultivation of the same land without break, contributed for reduced organic content and chemical degradation of soil in Ethiopia.[16]

Though soil erosion remained a serious problem in Ethiopia, recent threats on soil degradation are emerging with excessive application of pesticides and other agrochemicals. These are now abundantly used in rural areas as part of government plan to increase agricultural productivity. As indicated in the preceding chapters, pesticides with different nature are applied to cultivate flowers. The following section highlights the impact of these chemicals on soil fertility.

7.2. Flower Production Impacts on Soil

Accelerated soil degradation is mostly human-induced and amongst the various human activities that cause the problem is agriculture.[17] In agriculture, the problem arises when there is improper management of cultivated arable soils. These include excessive use of fertilizers, shortening of the fallow period in shifting cultivation, the use of poor quality irrigation water, absence or inadequate maintenance of erosion control measures, nutrient loss, salinisation and soil pollution.[18]

The use of chemical pesticides and fertilisers in plant cultivation is the main cause for soil pollution. In soil based flower cultivation, the growing system is cleaned

[13] Badege Bishaw, Deforestation and Land Degradation on the Ethiopian Highlands: A Strategy for Physical Recovery, *Northeast African Studies* (2001), Vol. 8, No. 1, p. 11
[14] Yesuf, et al, *supra* note 12, P. 21
[15] Berry, *supra* note 10
[16] Paulos Dubale, Soil and Water Resources and Degradation Factors Affecting Productivity in Ethiopian Highland Agro-Ecosystems
[17] Hannam & Boer, *supra* note 1
[18] *Ibid*., p. 4

against pathogens using disinfection and other sanitation techniques.[19] Chemicals are mainly applied to disinfest the soil. There are also possibilities of contamination with pathogens, nematodes and many others during the entire period of crop growth through, for example, water supply, air, insects, or inadvertently, by the grower. These problems require the application of pesticides. Chapters Two and Five discussed that chemical pesticides with different natures are used to control pests and produce flowers with good quality as required by the market.

Although in Ethiopia detailed researches are scant, it is indicated that the influence of floriculture effluent on soil quality is high.[20] Attah and Regasa studied samples from effluent run-off, water from adjacent river and soils around floriculture greenhouses in Holleta town and concluded that heavy metal contents (Fe, Cu, Ni, Mn, Zn, Cr, Co and Cd) are higher in soil than in both floriculture effluent and river samples.[21] The contamination of the soil with these metals, exceeding permissible levels, suggests the presence of potential threat for soil degradation. In another research, floriculture effluent samples were taken from farms at Debre Zeit and used for greenhouse experiments to grow wheat.[22] The research findings suggest that the effluent affects soil quality parameters. The soil chemical properties were found to be significantly influenced by the effluent. Both the PH and EC levels of the soil increased with increasing volumes of effluent. Holleta and Debre Zeit are among the five floriculture production cluster areas in Ethiopia and the following map shows their location.

The following map indicates that floricultural companies are highly consentrated in Holeta followed by Debre Zeit and Sebeta. The remaining are mainly located in the

[19] J. Postma (2010), "The Status of Biological Control of Plant Diseases in Soilless Cultivation" in U. Gisi, I. Chet & M. L. Gullino (eds), *Recent Developments in Management of Plant Diseases,* Springer Science+Business Media B.V., p. 134

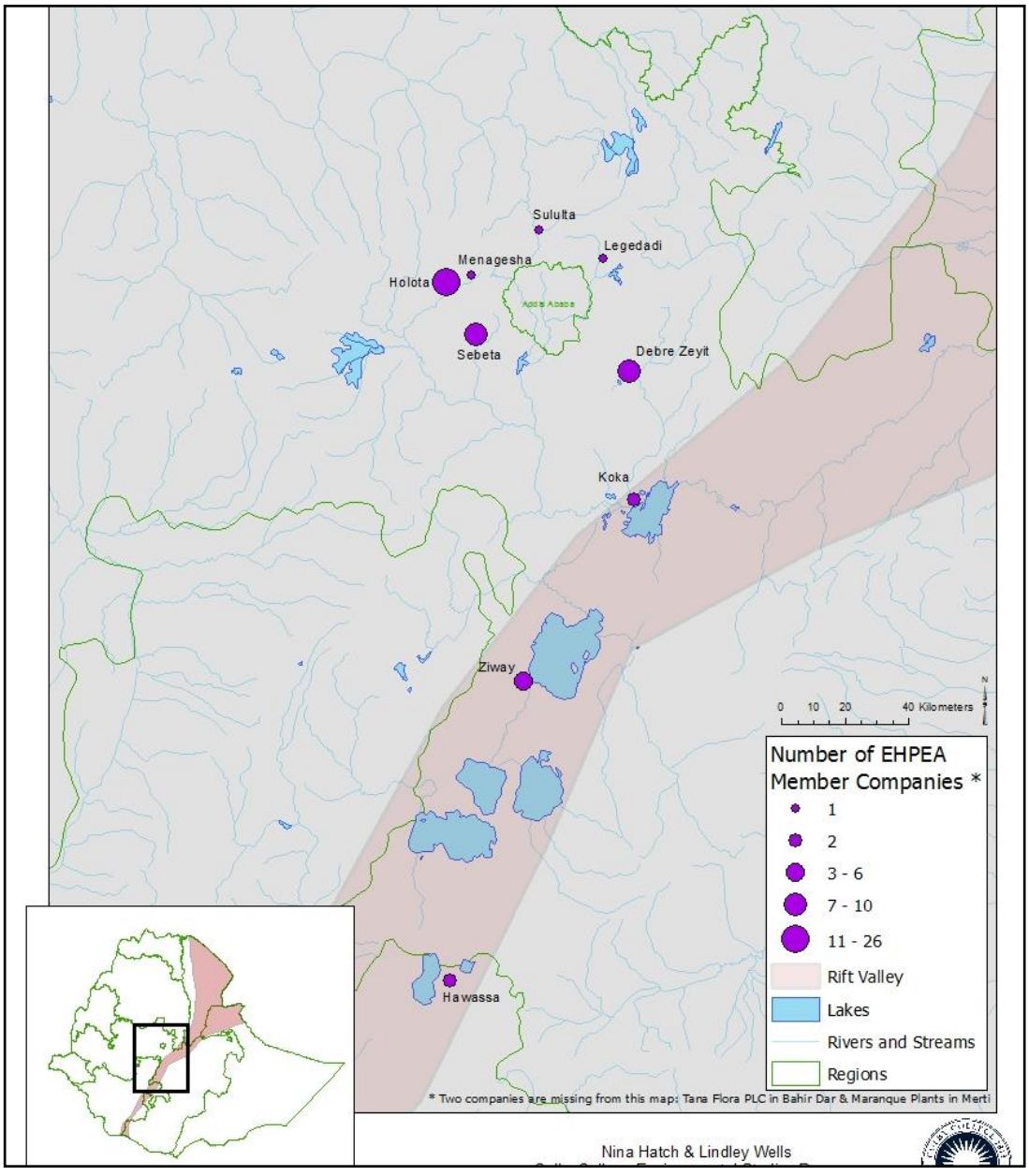
[20] M. Kebede, S. Beyene and Y. Abera, Modelling the influence of floricultural effluent on soil quality and dry matter yield of wheat vertisols at Debre Zeit, Ethiopia, *Journal of Environment and Earth Science* (2012), Vol. 2, No. 2, pp. 40-50.; L.E. Attah and Melkamu B. Regasa, Assessment of Heavy Metals, ph and EC in Effluent Run-off, River and Adjacent soil Around a Floriculture Industry in Holleta, Welmera District, Ethiopia, *Ethiopian Journal of Environmental Studies and Management* (2013), Vol. 6 No.6, pp. 620-629

[21] Attah, *et al*, *supra* note 20

[22] Kebede, et al, *supra* note 20

Rift Vally, adjacent to lakes. The consentration of farms in one area induces pressure on the soil and water resources. Several rivers and streams are found in the area where the farms are located.

Figure 5: Location of Ethiopian floricultural companies



Source: Modified from Nina Hatch and Lindley Wells.[23]

[23] Nina Hatch & Lindley Wells (2012), "Multilevel Environmental Governance -The Case of Ethiopian Floriculture' in Colby Environmental Policy Group, *Environmental Policy Update 2012: Development Strategies and Environmental Policy in East Africa,* Waterville, Maine: Colby College Environmental Studies Program, http://web.colby.edu/eastafricaupdate2012/key-issues-in-ethiopia-2012/chapter-2/ , accessed on 10 March 2015

7.2.1. Methyl Bromide for Soil Fumigation

Traditionally, methyl bromide has been a treatment of choice for controlling pests and soil-borne diseases.[24] It is mainly used as pre-plant treatment in the production of high value export crops such as tobacco, cut-flowers, strawberries and some vegetables.[25] This wide-spectrum soil fumigant is also useful to deal with most weed seeds and other organisms such as rodents. Since the chemical disperses quickly and suitable for intensive and continuous agricultural production, it has been used widely. It has been considered efficient and less costly than other fumigants. However, methyl bromide is extremely toxic and environmentally harmful.[26] It is listed as ozone depleting substance in the Montreal Protocol and, accordingly, its production and use must be seized by the deadlines established in the Protocol. Yet, the chemical is used in some counties.[27] Concerns about methyl bromide also include threats to the environment in the form of contamination of soil and water sources, as well as to soil biodiversity.

Table 4: Summary of the Phase-out schedule[28]

Year	Non-Article 5 (1) (Developed countries)	Article 5 (1) (Developing countries)
1991	Consumption baseline	
1995	Freeze	
1995-98 average		Consumption baseline
1999	25% reduction	
2001	50% reduction	
2002		Freeze
2003	70% reduction	Review of reductions
2005	Phase-out	20% reduction
2015		Phase-out

[24] Postma, *supra* note 19; J. Postma, E. v. Os, & P. J. Bonants (2008), "Pathogen Detection and Management Strategies in Soilless Plant Growing Systems" in M. Raviv & J. H. Lieth (eds), *Soilless Culture: Theory and Practice,* Elsevier, pp. 425-458; M. Pizano (2001), *Floriculture and the Environment: Growing Flowers without Methyl Bromide,* UNEP, Nirobi, http://www.uneptie.org/ozonaction/, accessed on 10 March 2015

[25] UNEP (2014), *Phasing-out Methyl Bromide in Developing Countries: A Sucess Story and Its Challenges,* UNEP, Nairobi, p. 4

[26] *Ibid*.; Pizano, *supra* note 24

[27] Postma, *et al*., *supra* note 24, p. 425; UNEP, *supra* note 25

[28] UNEP (2002), *The Montreal Protocol Control Schedule and Its Evolution,* OZONACTION PROGRAMME, October 2002, http://www.unep.fr/ozonaction/information/mmcfiles/3326-e.pdf , accessed on 11 May 2016.

Quarantine and preshipment applications of methyl bromide are exempt from the phase-out. Quarantine applications are performed or authorized by a national plant, animal, environmental, or health authority to prevent the introduction, spread, or establishment of quarantine pests.

Commercial flower production is greatly affected by severe diseases that may build up in the soil leading to high losses in yield and quality.[29] Sometimes eradicating these organisms from the soil can be difficult, especially when they affect the whole area rendering it unsuitable for the production of susceptible flowers. In these case soil disinfestations is mandatory. In many countries, methyl bromide has been used in cut-flower production for effective (in terms of cost and easy application) control of a wide range of soil-borne pests, insects, weeds and nematodes.[30] It is ideal to deal with some plant diseases, such as *Fusarium oxysporum* and *Verticillium spp,* which need to be controlled before the crops are planted. These cannot be controlled by post-plant fungicides.

7.2.1.1. Alternatives

With the phase out of methyl bromide, efforts have been made over years to find alternatives.[31] New chemistries, different methods of application and different soil coverings have been assessed to identify effective alternatives. Some chemical alternatives include: Chloropicrin, Telone II, Vapam/Basamid, and methyl iodide. However, adopting them into practice was found to be challenging.[32] While some considered these as promising and cost effective,[33] many flower growers around the world expressed deep concern about the effectiveness of the alternatives.[34] As there are strict quality demands on products, growers have been anxious about

[29] Pizano, *supra* note 24, pp. 17-18
[30] S. A.Tjosvold, C. L. Elmore & J. D. MacDonald (2000), *Alternatives to Methyl Bromide in Floricultural Crops - Project Update,* California; M. Ammati & B. Nyambo (2001), "Africa: Promising Alternatives in Kenya and Morocco" in R. Labrada & L. Fornasari (eds), *Global Report on Validated Alternatives to the Use of Methyl Bromide for Soil Fumigation,* FAO and UNEP, pp. 71-82
[31] C. L. Elmore, et al. (2007), *Soil Pests of Floricultural Crops and Potential Control: with Methyl Bromide Alternatives in California,* California Cut-flower Commission; UNEP, supra note 25
[32] Tjosvold, *et al*., *supra* note 30; Pizano, *supra* note 24
[33] Elmore, *et al*., *supra* note 31, p. 19
[34] Pizano, *supra* note 24, p. 19

business loss. It is reported that in many cases the alternatives are economically feasible, with costs that are very similar with fumigation with methyl bromide.[35]

Apart from the complexity and discourse of extra expenses, there is some dissatisfaction with chemical alternatives. The alternatives are said to be only helpful to control specific situations and crops, unlike methyl bromide which is broad spectrum pest control.[36] For instance, Chloropicrin can effectively control disease but it is said to be less effective for weed and nematodes. Vapam (metam sodium) and Basamid (dazomet) react with soil moisture to form methyl isothiocyanate, a fumigant that can provide good control on soil inhabiting nematodes and certain weeds. But their effectiveness in disease control is limited. Also the effectiveness of these alternatives is dependent on good application techniques.[37]

Other alternatives to methyl bromide include soil steam sterilisation, soil solarisation, biofumigation, crop rotation, and opting for resistant varieties.[38] In soil solarisation, for example, sunlight is used to heat moist soil to control various pest organisms. It is accomplished by using a clear, thin polyethylene covering on the soil during a period of high radiation, with little wind or cloud cover. Many organisms including weeds, soil pathogens and nematodes are sensitive to soil temperature exceeding 50^{o}C. In steam sterilisation, heat is used to kill pests, diseases and weeds that are present in the soil.[39] It involves injecting or diffusing hot water vapour into

[35] However, the economic analysis needs to consider factors that go beyond the mere cost of the chemical. For example, hydroponics (which is one kind of alternative) may require high initial investment, but the extra costs can be compensated by increased yield and quality. The cost comparisons can also be complex. UNEP (2012), *Evaluation of Methyl Bromide Projects, Executive* Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, Sixty-eighth Meeting Montreal, 3-7 December 2012, http://www.multilateralfund.org , accessed on 11 May 2016 . In some methods, although growers incur extra labour cost to hire personnel that scout the cropping areas and identify pest or disease outbreaks as early as possible, such cost can be compensated by reduced pesticide usage. *Ibid*., p. 9

[36] Tjosvold, *et al*., *supra* note 30, p. 89

[37] "Correct identification and a clear understanding of the specific pest and disease problems affecting a crop are essential to the selection of alternatives. Because alternatives do not generally result in broad-spectrum control of soil borne pests and diseases in the way [methyl bromide] does, it is extremely important to have appropriate knowledge about pest life cycles, symptoms, conducive/suppressive conditions and others". UNDP, *supra* note 35, p. 8

[38] Pizano, *supra* note 24, p. 21; Elmore, et al., *supra* note 31

[39] UNEP, *supra* note 25, pp. 30-31

the soil with the aid of a boiler and conductors to kill soil borne pests and pathogens.

Despite discontents about existing alternatives, examples for quality flowers production without the use of methyl bromide for soil fumigation can be found.[40] In Colombia, growers started to look for alternatives three decades ago. The majority of Colombian flower growers (over 95%) do not use methyl bromide for soil disinfestations due to the phytotoxicity problem that the chemical brings to the soil.[41] For many years the country remained the second flower exporter in the world next to the Netherlands. Hydroponic has successfully replaced methyl bromide in carnation and tomato production in Turkey and strawberry production in Morocco.[42] The use of soil solarisation for different crops including tomatoes, tobacco, melons, peppers, strawberries and flowers has been studied in various countries and it has been successfully used in methyl bromide phase-out projects in countries such as Egypt, Jordan and Costa Rica.[43]

7.2.1.2. Methyl Bromide Phase-out in Africa

UNEP conducted a study to assess the sustainability of methyl bromide phase-out in Africa.[44] The study states that all African countries are in compliance with the Montreal Protocol's obligation related to methyl bromide, but a visit to seven countries suggested that four of them were unable to meet reduction and phase-out targets.[45] Many countries fail to fulfil commitments because of insufficient training for customs officers, the difficulties in getting registered chemical alternatives, reluctance among some users to change to alternatives, and low level of awareness about the need to phase-out.[46] Users follow the opinion that methyl bromide cannot be replaced by one single and equally effective alternative and that

[40] Pizano, *supra* note 24; UNEP, *supra* note 25
[41] Pizano, *supra* note 24, p. 20
[42] UNEP, *supra* note 25, p. 31
[43] *Ibid*., p. 35
[44] UNEP, *supra* note 35
[45] These States include: Cameron (Cocoa and Coffee beans), Egypt ((horticulture, flowers and grain storage), Kenya (cut-flower and grain storage), Malawi (tobacco), Morocco (horticulture and cut-flower), Zambia (tobacco, cut-flower and horticulture), and Zimbabwe (tobacco and grain storage). *Ibid*., p. 2
[46] *Ibid.*

these alternatives require a different approach to production processes and pest control.[47] Alternatives were identified by UNEP's Methyl Bromide Technical Options Committee based on effective use around the world.

The 'Cut-flower' production was one of the four consumption sectors addressed by the study.[48] Methyl bromide was used in cut-flower production in African countries, such as Egypt, Kenya, Morocco, Zambia and Zimbabwe.[49] Consumption is now completely phased out in all of these countries. In Morocco, Zambia and Zimbabwe floriculture has diminished significantly due to climate conditions, shipping costs and political or economic crises. Cut-flower export in Zimbabwe dramatically decreased in recent years, but the country seized to be the second cut-flower exporter in Africa (after Kenya). Currently, it is Kenya that holds the largest floriculture sector in this group. In this country, growers have been replacing the chemical with dazomet and IPM.[50] Yet, the UNEP report notes that some flower growers from Kenya "moved to other countries initiating or expanding methyl bromide use".[51] Noting the significant expansion of flower production in Ethiopia, in just a few years, the report indicates that "this could increase potential for illegal trade to [methyl bromide] and may interfere with both the phase-out process and the adoption of alternatives".[52]

7.2.1.3. Methyl Bromide Use in the Ethiopian Flower Industry

There is limited available information about the use of methyl bromide as soil fumigant in Ethiopia. A study indicates that it has been used in the flower Industry.[53] The country ratified the Montreal Protocol on Substances that Deplete the Ozone Layer that controls specific uses of methyl bromide. Developed countries already phased out such controlled uses in 2005 while developing countries had to

[47] *Ibid*.
[48] Cut-flower is the main methyl bromide consuming sectors in Africa alongside with tobacco seedlings, horticulture (particularly tomatoes, but also melons, strawberries, bananas and a variety of vegetables) and postharvest treatment of grains.
[49] UNEP, *supra* note 35, p. 11
[50] Ammati & Nyambo, *supra* note 30, p. 74
[51] UNEP, *supra* note 35, p. 11
[52] *Ibid*.
[53] A. Tamrat (2011), *Toxication in Bits: Flower Industry Threatens Right to Water in Ethiopia,* the Sector's Socio-Economic Contribution and Environmental Standards, FIAN Germany, p. 15

phase out the use in 2015. The expectation in Ethiopia is that growers will gradually abandon the use of the chemical as market pressure increases.[54] This is fundamentally based on the assumption that flowers are meant for export and replacing methyl bromide with environmentally sustainable production method facilitates access to foreign market.[55] The use of methyl bromide is restricted by international certification schemes, such as GlobalGAP and MPS.[56] With the growing consumer pressure, flower importers in Europe now demand growers to comply with these and similar certification schemes. Accordingly, replacing the use methyl bromide with environmentally sustainable production methods is considered a necessary business requirement.

It is discussed in the forthcoming chapter that some companies in the Ethiopian floriculture industry are already with certificates. However, the number of companies certified with private environmental standards is not as such significant and, in the near future, it can be challenging for others to take part in the certification schemes due to costs that are involved with implementation. It is also important to note that the majority of flowers exported from Ethiopia are currently destined to the auction where there is no requirement to adhere to international standards. Thus, even if the use of methyl bromide is restricted by private international standards, it is difficult to completely relay on the standards to eliminate the use of the chemical from the industry. At the same time, there is no proof that can confirm beyond doubt that this and chemicals with similar nature are not used in the Ethiopian floriculture industry. The issue was raised during interview with Pesticide Registration and Control Expert at Ministry of Agriculture.[57] The expert said that the pesticide is not registered at the Plant Health Regulatory Directorate. But as explained in Chapter Five, floriculture companies are allowed to import and use pesticides without following the formal registration procedure. Because of this, there is lack of information that confirm the use or otherwise of the chemical.

[54] *Ibid*.
[55] UNEP, *supra* note 35 ; Pizano, *supra* note 24
[56] Detailed discussion about private environmental standards is made in Chapter 8
[57] Interview with W/rt. Saba Debebe, Pesticide Registration and Control Expert, Plant Health Regulatory Directorate, Ministry of Agriculture, 13 July 2015

In some African cut-flower sectors, methyl bromide has been replaced by soilless media (substrates) and chemical alternatives.[58] Yet, production in soilless media was found to be expensive due to high prices of import supplies (i.e. seedling trays and substrates).[59] Particularly in Kenya there were constraints with substrate recycling and/or disposal. Similarly, growers in the Ethiopian flower industry hold that this method of production is expensive. Steaming was initially offered as an alternative, but it is not widely used because of high operational costs.[60] The efficiency of the alternatives presupposes the development of new technical skills. In relation to this, some farm managers in the Ethiopian flower Industry articulate that alternatives are expensive, and costs need to be compensated with better price for methyl bromide free flowers.[61]

7.2.2. Fertiliser Use

In the Ethiopian floriculture industry, about 30 kinds of fertilisers with Nitrogen, Potassium, phosphorus, and micronutrients content are used.[62] Approximately 89 gm of fertilisers are used to produce a bunch of roses.[63] Nitrogen is the major emission from nitrogen-based fertilisers, such as calcium nitrate, potassium nitrate, magnesium nitrate, urea, ammonium nitrate, mono-ammonium phosphate and ammonium sulphate. These have the highest share in the total fertiliser use. Nitrogen-based fertiliser forms ammonium ($NH4^{+}$) and nitrate ($NO3^{-}$) in soil. While the former is quickly converted to nitrate in most types of soil, the latter is susceptible to leaching to deeper soil. It is estimated that more than 30% of nitrogen applied to ornamental plants leaches deeper down into the soil and, based on this estimate, it is concluded that there is 3 gm nitrate emission to the soil per bunch of rose.[64] This only applies for soil based cultivation. It is presumed that in hydroponics farms recycle drained water and fertiliser during cultivation. But, this later form of cultivation is rarely used in Ethiopia and the amount of nitrogen that

[58] UNEP, *supra* note 35
[59] *Ibid*., p. 9
[60] *Ibid*.
[61] Tamrat, *supra* note 53
[62] Abiy Sahle and José Potting, 'Environmental life cycle assessment of Ethiopian rose cultivation', *Science of the Total Environment* (2013), Vol. 443, p. 167
[63] *Ibid*.
[64] *Ibid*.

leaches into the soil will, accordingly, be high. Growers also use nitric, sulphuric, phosphoric and boric acids to adjust the Ph of the fertigation water (fertilizer and water).[65]

Sahle and Potting concluded that intensive use of fertilisers, especially, calcium nitrate, is the main contributor to environmental impact of rose cultivation in Ethiopia.[66] Nitrate-based fertilisers (typically calcium nitrate) are highly used in all cultivation areas in Ethiopia.[67] These types of fertilisers lead to emission of NO-3 to soil and atmospheric emissions of N_2O, NH_3 and NO_X. Factors, such as type of fertilizer, method, time and rate of application, soil conditions, and weather conditions, may affect the emission of these chemicals.[68] When nitrogen is found excessively in the soil, it, gradually, leads to accumulation into water bodies and algal blooms (eutrophication). It obstructs the PH level in the soil and water bodies, and negatively affects nutrient availability for plants and aquatic organisms.

7.2.3. Hydroponic in the Ethiopian Flower Industry

Introducing soilless culture or hydroponic growing method is advantageous in terms of eliminating or reducing impacts of pesticides, including methyl bromide, and fertilisers on soil.[69] Following the phase-out of methyl bromide growers in countries, such as Israel, shifted to hydroponic production.[70] Overview of this growing method is provided in Chapter Two of this research. Particularly, the use of closed hydroponic system enables to eliminate the leaching of nutrients and pesticides to the soil. In this system, the reuse of all effluent from the root zone helps to avoid pollution of ground and surface water. It helps to improve fertiliser and water-use efficiency.

[65] *Ibid*.
[66] *Ibid*.
[67] *Ibid*., p. 171
[68] *Ibid*.
[69] E. v. Os, *et al*, Microbial optimisation in soilless cultivation: a replacement for methyl bromide, *Acta Horticulturae* (2004), Vol. 635, pp. 47–58; Postma, *supra* note 19; UNEP, *supra* note 25
[70] B. Shannon (2009), *Sustainable Production Technologies for the Cut-flower Industry,* International Specialised Skills Institute, Melbourne, p. 18

In Ethiopia, most flowers are grown on the soil. Only a few rose growers have introduced hydroponic as growing medium.[71] Most flower growers have the attitude that hydroponics is expensive and involves more cost.[72] Among the farms that started hydroponic production some have resorted to soil medium. Conducting case studies on selected flower farms, Nour found out that the environmental contributions of hydroponic is recognized by farm managers, but the view among many is that the management of the system involves more cost.[73] First, more investment cost is incurred because in addition to preparation of soil beds and drip irrigation (also done for soil-grown flowers) there is a need to install water drainage and troughs under the volcanic red ash. Second, the recycling of water involves high cost since the water drained from greenhouses requires treatment. Growers may also incur cost to employ expertise to run the system.

Even if hydroponic requires high initial investment than that typically associated to soil based production, over the long run, it is better productive and efficient.[74] There will be increased yield per hectare due to higher planting densities and better quality flowers that can compensate extra costs. In relation to this, Nour explains the experience of Bukito flower farm (domestic owned) in hydroponic flower production.[75] In the farm, flowers are grown on red volcanic ash put on a trough. It is affirmed that this method of flower growing helps to protect the soil in greenhouses from adverse impact of chemicals, pesticides and fertilisers. At the initial stage, the production system involves more investment costs, however better harvest can later on be achieved. The experience of the farm indicates that the

[71] Tsegaye Abebe, President of Ethiopian Horticulture Producers and Exporters Association (EHPEA), Interview with The Reporter, Local Newspaper (Saturday, 14 August 2010).) Among farms that introduced hydroponics include Lafto (joint venture), J. J. Kothari, Joy Tech and Sheba (all are foreign owned). Roshinara Roses (foreign owned) uses both hydroponics and soil while Spirit Flower (foreign owned) uses a medium similar to hydroponics for other products. Bukito (domestic owned farms) uses hydroponics while other domestic owned farms Dire Flower, Dugda and Minaye partly use hydroponics in flower growing. Elias Nour (2012), *The Investment Promotion and Environment Protection Balance in Ethiopia's Floriculture: The Legal Regime and Global Value Chain,* PhD Thesis, University of Warwick, Uk, pp. 181, 250. It is indicated in another literature that in Ethiopia only about 10% roses are grown on hydroponics (cocopeat or red ash). See DLV Plant (2011), *Handbook for Greenhouse Rose Production in Ethiopia*, http://www.dlvplant.nl/nl/core/media/file/Handbook_Rose_Ethiopia(1).pdf , accessed on 6 August 2015

[72] Nour, *supra* note 71

[73] *Ibid*.

[74] UNEP, *supra* note 25, p. 31

[75] Nour, *supra* note 71, pp. 228- 232

harvest of a flower (i.e. cut to cut cycle) grown; using hydroponic takes relatively shorter days compared to those grown on soil.

Additional advantage of hydroponics is reduced vulnerability to the pests and pathogens.[76] Soil grown flowers are more susceptible to Downey mildew due to high humidity that exists in the soil. Bukito farm did not face this problem unlike farms at the neighbourhood. Moreover, hydroponic minimizes the risk of spider mites that find warm settings very conducive. This might be due to the very nature of the production system itself that allows air circulation between plant roots. The study also indicates other advantages that relate with cost of fertilizer and water.[77] Since in hydroponic production the water is recycled after treatment and the recycled water contains nutrients, lesser amount of fertiliser is needed. The recycle and reuse of water significantly reduces the volume of water that is extracted from water resources.

A point of concern in relation to hydroponic system is plant disease outbreak due to possible presence of pathogens in drainage water. Recirculation of nutrient solutions may facilitate the rapid spread of soil-borne pathogens. In order to control these problems, the water is treated using different disinfection techniques such as heat treatment (UV radiation), sand filtration or chemical disinfection (chlorination or hydrogen peroxide application).[78] Some of such treatments, however, need high financial investment.[79] Bar-Yosef points out that the adoption of recirculation is slow because of two major factors.[80] The first is the high initial investment which is required to switch to closed-loop irrigation system. Second, there is uncertainty about potential savings in water and fertilizer use as well as lack of knowledge regarding optimal operation of recirculation systems.

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[76] *Ibid*.
[77] *Ibid*.
[78] See Chapter Two, Section 2.2.2
[79] Os, *et al*., *supra* note 69
[80] B. Bar-Yosef, 'Fertigation Management and Crops Response to Solution Recycling in Semi-Closed Greenhouses', in M. Raviv and J. H. Lieth (eds.), (2008) in *Soilless Culture:Theory and Practice,* Elsevier, p. 342

The cost involved with water treatment and lack of knowhow are leading most Ethiopian rose growers that introduced hydroponic to reuse drained water without full-scale treatment.[81] The growers simply add micro-elements, a measure which is not adequate to prevent the spread out of disease during reuse. As noted above there are different options and procedures to treat the water drained from greenhouses. These procedures are necessary to block the entry of pathogens to the irrigation system. Failure to employ appropriate treatment methods can adversely affect farm sustainability.[82] Apart from this, unless otherwise the drained water (loaded with chemicals and pesticide residues) is treated, it may bring devastating impact on the environment.

In addition, Hydroponic needs to be managed perfectly as excess or deficiency of water can have great impact on crop growing in a contained system than in soil. [83] Yet, there is frequent electric power interruption in Ethiopia, which affects the continuous supply of water and fertilizers.[84] In relation to this, a farm director explained that

> … growing on hydroponics needs perfect management of irrigation and fertilization and a technical advanced fertigation system, as the buffer capacity of a hydroponic system is much lower as compared to that of growing in the soil. The situation in Ethiopia at the moment is as much that the technical service in case of failure or breakdown of the system is limited and cannot be solved immediately, which is unacceptable in case of rose cultivation and will cost a lot of production.[85]

[81] Nour, *supra* note 71, p. 232
[82] *Ibid*.
[83] DVL Plant, *supra* note 71, p. 49
[84] *Ibid*.
[85] *Ibid*., p. 52. Philippe Veys, director of Olij Roses in Ethiopia. In 2007, Olij Roses Ethiopia started to grow on hydroponics (coco peat), but shifted to soil based production in 2010 for reasons other than power interruption. The farm found out that hydroponics entailed higher production costs associated with higher water consumption. The soil type in their farm, black cotton soil, have better water holding capacity, which accounts for significant less water use as compared to coco peat hydroponics. The director also mentioned the high cost incurred to import coco peat due to

In hydroponic the plant completely depends on automated application of water and fertilizer. Where there is electric power interruption, there is high risk of plant damage. Since this is a major problem in Ethiopia, growers are always at anxiety.[86] Some opted for diesel generator, which is by far expensive than regular electric power supply. This not only heightens the view that hydroponic is expensive but also risk sensitive.

Soil based production may inevitably affect soil fertility and pose doubts on the suitability of the land for future food production. In this mode of flower production, the first cohort of rose plants may last for about six or seven years before they are replaced by a new generation of flower plants.[87] After the first generation of roses planted on unprotected soil, there will be lower returns per unit of hector because of such factors as pesticide treadmill. The water resources they depend on for production and the soil nutrients gradually deteriorate. These may cast shadow over the enthusiasm for job opportunities, foreign exchange earnings and other anticipated benefits of investment.

7.2.4. Initiatives to Introduce Biological Pest Control

Apart from chemicals intentionally applied to the soil, pesticides and herbicides are sprayed on the plant during the growth period, depending on pest and disease outbreak. About 50% of the sprayed chemical misses its target and falls on to the soil surface.[88] Some of these may persist in the soil for years while a large proportion evaporates. Chemicals, after a typical application, may move from the surface layers of soil to the soil vadose zone and eventually to groundwater. This process of leaching is carried by the downward movement of water following rain or irrigation. The persistence and transport of pesticides in soils depends on several factors, including the chemical structure of the compound, type of formulation,

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regulation as discouraging factor to implement hydroponics in Ethiopia. Philippe Veys, director of Olij Roses in Ethiopia, a rose breeder and propagator

[86] Interview with Mr. Gosaye Dechasa Obse, Development and Technology Transfer Directorate Director, Horticulture Development Agency (HAD), 24 July 2015

[87] Nour, *supra* note 71, p. 262

[88] WHO (1990), *Public Health Impacts of Pesticides Used in Agriculture,* WHO: Geneva, p. 65, http://apps.who.int/iris/bitstream/10665/39772/1/9241561394.pdf , accessed on 20 December 2014

types of soil, weather conditions, irrigation, type of crop, and the microorganisms present in the soil, though.[89] Yet the chemical that moved into the environment can adversely affect public health and beneficial biota by contaminating the soil, water and atmosphere.

Reducing the amount of chemical pesticide used in any crop production has paramount importance to protect the soil and the overall environment against degradation. Biological control is among the practices that enable to minimize chemical spray on crops to control pests and diseases. This involves the controlled release of insects or animals that consume pests.[90] For example, carnivorous variety of mites (*amblyseius califonicus* and *phytoseiulus persimilis*) can be unleashed to feed on spider mites (*tetranychus urticae*) that reproduce quickly and devastate rose plants within few days.[91]

Spider mites are among the main pests that affect roses.[92] The most common species of spider mites found in Ethiopian rose crops are the two-spotted and red spider mites.[93] By size they are, somehow, equivalent with a sesame seed and they gather under leaves to suck nourishment out of moist cells. Feeding marks are shown as small yellow speckled spots. Spider mites can cause a reduction in flower yield and aesthetic injury to the rose leaves. Under favourable conditions, they reproduce quickly. Within a month, a single mature female spider mite can populate a greenhouse with a million offspring.

Chemical control of spider mites can be difficult.[94] It involves the application of pesticides specially developed for spider mite control. Since they are small in size and reside on bottom side of the leaves, thorough coverage during spraying can be difficult. They reproduce themselves in accelerated rate, adopting quickly to resist pesticides, and their eggs remain unaffected by most insecticides. As a result,

[89] *Ibid*.
[90] See Chapter three, Section… for detail discussion on biological pest control methods
[91] DVL plants, *supra* note 71, pp. 138, 145; Gabriela Perdomo (2011), 'The Cannibal Killers Behind the Perfect Rose', *The Tyee*, http://thetyee.ca/News/2011/05/18/CannibalKillers/ , accessed on 12 May 2015
[92] Perdomo, *supra* note 91
[93] DVL plants, *supra* note 71, p. 138
[94] *Ibid*.

chemical spraying takes place repeatedly. There are, however, natural enemies, such as small lady beetles, predatory mites, minute pirate bugs and predatory thrips, which can help to control the problem.[95] Predatory mites, for example, are feed on spider mites and considered "foot soldiers in an effort to reduce the use of pesticides".[96] The method is advantageous, both in preventing the economic loss and protecting the environment and human health.[97]

There have been initiatives to introduce biological pest control in the Ethiopian flower industry. According to the Ethiopian Horticulture Sector Statistical Bulletin, about 34 flower growers introduced the method partly in their greenhouses.[98] AQ Roses, Blen, Et Highlands, J. J. Khotari, Joy Tech, Linsen, Minaye, Sher Ethiopia and Ziway Roses were mentioned for their good practices of using integrated pest management by Ethiopian Horticulture Producer Exporters Association.[99]

Afriflora (Shar Ethiopia) is one of the farms that widely introduced predatory mites for the control of spider mites since the beginning of 2011.[100] The company introduced biological control method because chemical pesticides targeting the pest were found to be less effective and due to customers' demand for chemical free flowers.[101] With the use of predatory mites, the company managed to reduce the amount of spray by 90%. According to the information from the company's website, Afriflora aims to cultivate roses bellow the maximum pesticide residue level of most supermarkets. For this purpose and to produce the required quality flowers, two different types of predatory mites are released every week to control plant consuming mites (spider or thrips). The company expresses that this

[95] *Ibid*.
[96] Perdomo, *supra* note 91
[97] R. Charudattan, S. Chandramohan & G. S. Wyss, 2002. "Biological Control" in W. B. Wheeler (ed.), (2002), *Pesticides in Agriculture and the Environment,* Marcel Dekker, New York and Basel
[98] EHDA (2012), *Ethiopian Horticulture Sector Statistical Bulletin*, no. 01. Ethiopian Horticulture Development Agency, October 2012, http://www.ehda.gov.et/
[99] Nour, *supra* note 71
[100] Information retrieved from Afriflora official website, www.afriflora.nl/en/sustainability/environment, last visited 12/05/2015
[101] *Ibid*

significantly contributed for 'the sharp reduction' in the use of chemical pesticides.[102]

ET Highland Flora is the other farm that introduced predatory mites for the control of spider mites.[103] The farm, which is located in Sebeta area, started the method with a trial in one of its greenhouses, in collaboration with Jimma University, Koppert and Wagningen UR, and gradually scaled up to all greenhouse as the results were found positive. Through this measure the farm managed to save about 60 % of the cost allocated for chemical pesticides control of spider mites.[104] The volume of chemical used by the farm also sharply declined after the introduction of biological control. The farm successfully managed to produce predatory mites by its own and sales the agents on local market.[105] The manager of the farm explains that chemical control of spider mites is challenging and IMP is better advantageous:

> … After the trial on our farm we were able to make a good comparison between IPM and conventional chemical pest control for the variety we did the trial for. Some of the benefits we directly observed were: increase in stem length, shinier leaves and bigger leaves. In general the crop looks much healthier. Besides that, the working conditions for the employees are also better.[106]

Production manager at Tinaw farm, located in Wolkite area, has similar view about the benefits of introducing biological control agents.[107] The farm started trial in 2009 in some of its greenhouses and compared the result with the other greenhouses where conventional crop protection was practiced. According to the manager, after the introduction of the method, both production and quantity increased.[108] He explained that initial costs can be incurred by a farm, but once the balance between the agent and the pest is established, there will be no need to

[102] *Ibid*.
[103] Nour, *supra* note 71, pp. 227-228; DVL plant, *supra* note 71, p. 73
[104] *Ibid*.
[105] Interview with Mr. Gosaye Dechasa Obse, *supra* note 86; Interview held with Mr. Yeraswork Yilma, Integrated Pest Control Expert, Ministry of Agriculture, 13 July 2015
[106] DVL plant, *supra* note 71
[107] *Ibid*., p. 74
[108] *Ibid*.

purchase new control agents. This means the method is cheaper than conventional crop protection (i.e. chemical pesticide). The employees of the farm were trained in scouting by the biological agent supplier to be acquainted with the pest control method which was completely new for them.

Following the introduction of biological control methods, companies were able to control spider mites, which was major problem for rose production. Broad spectrum chemical pesticides, which were effective to eliminate a range of pests that affect flower production, were used before the introduction of biological control. As these chemicals seized to be applied by growers, other kinds of pests which were not major problems to the sector and cannot be controlled by predatory mites started to emerge.[109] In biological pest control methods, a natural enemy usually can only control one kind of pest. This means a grower has to find other solutions, either biological or chemical, for the control pests with different natures. Growers are thus confronted with either to introduce other predatory for the control of the pests or use chemical pesticides for those problems. Applying chemical pesticides, however, can also kill the natural enemy- predatory mite. This complicates the management of pest problems by biological methods challenging growers in terms of cost and expertise. A manager from one of the successful companies that early introduced biological pest control, explains the problem as follows:

> Although IPM has a good effect on controlling spider mites, other pests have become more of problems than before, especially in case of trips, aphids and mealy bugs. In principle, every pest can be controlled in a biological way, but it needs to be profitable. Apart from spider mites, the other pests now need to be controlled with selective chemicals, which … can be used in combination with IPM. At first, these selective chemicals weren't available in Ethiopia and had to be imported from The Netherlands or Kenya, which caused

[109] Interview with Mr. Gosaye Dechasa Obse, *supra* note 86; Interview with Dr. Adhanom Negasi, IPM Component Manager, Horticulture Producers Exporters Association, 27July 2015

problems with availability. The availability of these chemicals improved since.[110]

7.2.5. Factors Affecting the Introduction of Improved Technologies

The preceding sections highlighted on alternative technologies to reduce flower production impacts on the soil. However, high technology can be expensive in developing countries due to such factors as competition, lack of knowledge and higher cost of skilled manpower.[111] Nour outlines the major reasons for farms to shy away from introducing agricultural technologies, including hydroponic production system.[112] Cost is the first factor and this is thoroughly discussed in Section 6.2.2. There are high initial investment costs and expenses to run hydroponic based flower production. These have been mentioned, including by farm managers, as discouraging factors from introducing the method even if the costs are said to be compensated with productivity and effectiveness. These also are constraints to widely introduce biological pest control in the sector. On the positive side, however, biological pest control methods enable companies to minimize costs incurred to purchase chemical pesticides.

The second factor relates with technical skills and lack of awareness about benefits and costs. Unlike soil based production and the conventional pest control mechanism by chemicals, hydroponic and biological pest control methods require expertise. Companies need to train their workers or employ trained workers. These involve additional costs, which can be compensated or reduced in the long run as reported by floricultural companies in Kenya.[113] However, lack of confidence among growers about financial returns for expenses incurred by engaging in good agricultural practices either through increased efficiency or increased market price still remain discouraging factors.

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[110] DVL plant, *supra* note 71, p. 73. Manager at ET Highland Flora, one of the successful companies that early introduced biological pest control

[111] Nour, *supra* note 71, p. 218

[112] *Ibid*.

[113] Bruno Leipold & Francesca Morgante, The Impact of the Flower Industry on Kenya's Sustainable Development, *International Public Policy Review* (2013), Vol. 17, No. 2, pp. 1-31.

A study conducted in Kenya explains that large corporations are in a much better position than small-scale farmers in quick adaption to new measures, such as the Zero Pesticide Residue Regulation in the European Union.[114] Larger producers and exporters "are able to have some control over their production practices, particularly with regard to the interval between pesticide sprays and picking".[115] They benefit from the European market as they have financial and technological capacities to add values to their produce. In contrast, small landholders lack these privileges and have limited access to credit and technical information, which is often acquired through employing expatriate consultants.[116] They have to go through "a process of trial and error" to obtain this information and succeed in business.[117]

Cost and lack of technical expertise can be constraining factors, however in some cases it is also large foreign-owned farms that refrain from introducing agricultural technologies. For instance, Sher Ethiopia (Afriflora), the largest flower farm in Ethiopia, is completely engage in soil based production.[118] Yet large foreign owned farms are believed to have better economic performances and lesser rate of project distress compared to domestic-owned farms.[119] They are also better equipped with technological capabilities and have market niche to the direct market which offers better price. As explained by Mr. Gosaye, Development and Technology Transfer Directorate Director at Horticulture Development Agency:

> The Dutch, for example, were already in the business and come to Ethiopia because they were attracted by favourable investment climate. So, they were with the knowhow and technology from the start. Almost all companies owned by Ethiopians started from the scratch. They employed experts from

[114] C. B. I. Mussa, et al, Eastern and Southern Africa: the Experiance of Kenya, Mozambique, the United Republic of Tanzania and Uganda, in V. Jha (ed.), (2005), *Environmental Regulation and Food Safety: Studies of Protection and Protectionism,* International Development Research Centre and Edward Elgar Publishing Limited, pp. 106-107.
[115] *Ibid*., p. 106
[116] *Ibid*., p. 107
[117] *Ibid*.
[118] Personal observation during farm visit in April, 2014
[119] Nour, *supra* note 71, pp. 248-250

> Kenya, Holland and India. Some still have foreign experts. It is through time that Ethiopian workers acquired the skill and expertise. Accordingly, foreign owned companies had better advantages in business. Also there are some Ethiopian owned farms such as Et-highlands, Saron roses, Yasin, Dugda and Tinaw, that are better competitive with their counter parts.[120]

Therefore, unless there is government driven incentive or coercive method to encourage companies introduce technologies and engage in sustainable flowers production, it may not be possible to bring fundamental change in the industry.

The third factor that contributes to limited adoption of agricultural technologies is the land tenure system that fails to recognize private ownership of land, which may has impact on the level of the farm owner's diligence in protecting the land and its resources.[121] Article 40 (3) of the Ethiopian Constitutions states that "the right to ownership of rural and urban land, as well as of all natural resources, is exclusively vested in the State and in the peoples of Ethiopia. Land is a common property of the Nations, Nationalities and People of Ethiopia". Better land management is premised on farm practices such as crop rotation, tree planting, terracing and other soil conservation practices. Based on the assumption that tenure arrangement encourages improved land management, it can be concluded that private land ownership significantly and positively contribute to land investment, promotes adoption of new technologies, and soil conservation practices.

7.2.6. Future Actions

In countries where soilless production represents a large portion of agricultural productivity, focus of attention is on creating regulatory basis that force recirculation.[122] This is to require growers to capture and reuse effluent from production systems and, accordingly, minimize environmental risks. Recognizing the

[120] Interview with Mr. Gosaye Dechasa Obse, *supra* note 86
[121] Nour, *supra* note 71
[122] M. Raviv and J. H. Lieth, 'Significance of Soilless Culture in Agriculture', in M. Raviv and J. H. Lieth (eds.), (2008), *Soilless Culture:Theory and Practice,* Elsevier, p. 8

efforts to introduce biological pest control and the use of hydroponic in the Ethiopian flower industry as worth noting, Nour suggests:

> there is [] the need for regulatory schemes that require the reuse of water by, for example, rendering hydroponics mandatory in future projects and extensions or at least initially using incentive schemes for hydroponics. Moreover, the efforts to introduce biological pest control can be scaled up in all flower farms.[123]

The challenge associated with the requirement is the possible economic pressure on commercial growers. "Adoption of a closed recirculation system involves careful study of the economic factors".[124] It seems that the practice is hardly attainable unless the true expense of water treatment is known and integrated into final costs. Still the challenge remains that it is difficult to anticipate whether customers will be willing to pay additional costs considering the process of production under which the product passed through. This issue is further discussed in forthcoming chapter in relation to customers' willingness to pay premium price for products certified with private standards.

Some farm managers hold the view that the Ethiopian government should support and promote biological pest control methods by facilitating easy registration and local reproduction of the agents.[125] Due to weak financial and technical capabilities, well researched and identified biological agents are not available in the country. At the same time, companies face problems to import biological agents. The Pesticide Control and Registration Proclamation (No. 674/2010) requires that biological pesticides, like any chemical pesticide, need to be registered before they enter the country.[126] The term 'pesticide' is defined to include living organisms intended for the control of pests. [127] However, there is no such registration as the requirement

[123] Nour, *supra* note 71, p. 259
[124] M. Raviv, et al, "Growing Plants in Soilless Culture: Operational Conclusion" in M. Raviv and J. H. Lieth (eds.), (2008), *Soilless Culture:Theory and Practice,* Elsevier, p. 554
[125] DVL plant, *supra* note 71, p. 74
[126] See Article 2(20) and Article 3, Pesticide Registration and Control Proclamation (No. 674/2010).
[127] The term "pesticide" is defines under Article 2(20) of Pesticide Registration and Control Proclamation (No. 674/2010) as "any substance or mixture of substance or a living organism intended for preventing, destroying or controlling "of any pest, including vectors of human or animal

and other criteria for registration are yet to be developed.[128] At the moment companies are importing the agents 'for own use' governed by quarantine law for phytosanitary purposes.[129] Companies claim that it is not financially feasible to import agents in this way and they urge the government to allow the import of biological agents for business purposes so that they can get easy access to the agents.[130] The import procedure is said to be complicated and time taking. Anxious about the unforeseen impacts on non-targets and the environment, responsible government organs urge for stringent system of control on the import of bio-agents.[131] Even once they are imported, there should be some regulatory system to control their proper use.

Currently, companies that intend to import agents first apply to the Ministry of Agriculture. The Ministry assess whether the method has been used in other countries and effective to control the problem for which the use is intended for.[132] The applicant is required to present authenticated copy of phytosanitary certificate issued by concerned government organ in the country of origin.[133] Then he/she is allowed to import samples which are taken to the Ethiopian Institute of Agricultural Research for efficacy tests.[134] The next step in the process is assignment of experts that undertake the tests. The experts carry out desk researches to find out whether the agents can bring impacts on non-targets or the environment, generally. They unleash the sample bio-agent on the field where they evaluate the effectiveness of the agent to control the pest applied for. This may take one year or more.[135] Based

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disease and unwanted species of plants or animals. Under Article 2(6), the Proclamation defines "biological control agent" as "a natural enemy, antagonist or competitor or other organism used for pest control, and includes biochemical and microbial pest control agents".

[128] Interview with Mr. Alemayehu Wolde Amanuel, Pesticide Reduction Program/Ethiopia, Co-coordinator, Ministry of Agriculture, Addis Ababa, 13 July 2015; Interview with Dr. Himanot Abebe, weed Expert, Ministry of Agriculture, Addis Ababa, 16 July 2015

[129] *Ibid*.

[130] Interview with Dr. Adhanom Negasi, *supra* note 109

[131] *Ibid*. The concern mainly came from Environmental Protection Authority and Biological Diversity Protection Agency. Interview held with Yeraswork Yilma, *supra* note 105

[132] Interview with Mr. Alemayehu Wolde Amanuel, *supra* note 128. The Ministry does not currently allow the import of those agents with bacteria and fungus nature to avoid any risk on human health and the environment.

[133] Interview with Dr. Himanot Abebe, supra note 128.

[134] Interview with Dr. Mohammed Daud, Entomologist, Ethiopian Institute of Agricultural Research, Plant Protection Research Centre , Ethiopian Institute of Agricultural Research, 23 July 2015

[135] *Ibid*.

on the report presented by the Institute, the applicant is allowed to import predators. Importers are required to transport and store the predators under controlled situation.[136]

7.3. National Legislative Framework for Soil Protection

Some States have developed a framework of legislation that aim to protect structural soil and specifically address soil related problems.[137] Previously, the main type of legislation whose objective is control of soil degradation has been the "soil conservation law".[138] Under this legislation the term "land degradation" has been used to refer to problems arising from mismanagement of soil and land.[139] Since the focus of the legislation has been land utilization, it is found inadequate to effectively protect and manage soil.

In early 1990's, soil conservation legislation was introduced in colonial Africa, Australia, New Zealand, the United States and some European and Asian nations mainly to control the effects of soil erosion.[140] Gradually, it was recognized that a wide range of land management programs, policies and educational initiatives together with national laws is necessary to achieve the goal of sustainable land management. Close examination of existing national legislation indicates that a broad range of legal mechanisms have been used to protect and manage land.[141] Countries like the UK have legislative mechanisms covering a range of items, including soil planning, resource access, organic farming practices, nitrate sensitive areas, and soil restoration.

In Ethiopia, there is no separate legislation on soil protection. Other legislations concerning waste disposal, pollution and pesticide regulation can somehow extend protection for the soil. Environmental pollution Protection Proclamation (No. 300/2002) protects the soil against pollution and requires clean-up and remediation

[136] Interview with Dr. Himanot Abebe, *supra* note 128
[137] Shelton & Kiss, *supra* note 2
[138] I. Hannam & B. Boer (2002), *International and National Legal and Institutional Frameworks for the Sustainable Use of Soil,* ISCO, Beijing, p. 167
[139] *Ibid*.
[140] *Ibid*.
[141] *Ibid*.

of polluted soil. It states that standards for the types and amounts of substances that can be applied to the soil or be disposed of on it shall be formulated (Article 6(1) (C)). Pesticide Registration and Control Proclamation (No. 674/2010) protects the soil against banned or restricted pesticides through regulating the formulation, manufacturing, importation and sell of the products. Forestry law (Forest Development, Conservation and Utilization Proclamation No. 542/2007) aims to avoid erosion and consequent flooding while laws related to solid waste (Solid Waste Management Proclamation No. 513/2007) and hazardous waste can protect the soil against contamination. Though these laws assist in regulating soil degradation, by managing some of the activities that directly lead to the problem, the protections they extend for soil are not adequate as most of the elements important to safeguard are missing. The legal instruments treat soil degradation in fragmented way.

A sound legal and institutional framework for sustainable soil is required for various reasons.[142] It is important to create an enabling environment for farmers and agencies to adopt sound management practices that enable to enhance productivity. As soil is biological habitat, and central component in most ecosystems, its preservation through legal regulation is important to conserve biodiversity. It is possible to integrate comprehensive procedure for soil protection and management into broader legislation that sets out responsibilities for the protection of other environmental media, such as forest, water, biodiversity, desertification, land management.[143] Nevertheless, since the frameworks are designed to safeguard media other than soil or promote other objectives, there are doubts about the level of protection they extend for the soil.[144] Normally these do not constitute a coherent soil protection policy and address all aspects of soil protection and, accordingly, States should enact a separate legislation on soil protection. This has been raised in the European Union, as EU law does not address

[142] Hannam & Boer, *supra* note 1
[143] *Ibid*., p. 6; Shelton & Kiss, *supra* note 2
[144] European Commission (2015), *Soil* [Online] http://ec.europa.eu/environment/soil/index_en.htm accessed on 12 May 2015

all the threats to soil in a comprehensive way and not all Member States have specific legislation on soil protection.[145]

In 2005 and 2006, the European Commission adopted seven thematic strategies and soil strategy was one of them.[146] The strategy, as the first step in the development of a proper soil policy in the EU, addresses the full range of threats and creates a common framework to protect soil. It requires member States to identify risk areas for erosion, organic matter decline, compaction, salinization and landslides. In relation to contamination, the Strategy demands Member States to identify sites in their territory and establish a national remediation strategy. A binding legal framework is, however, lacking in the EU as the Proposal for Soil Framework Directive was withdrawn by the Commission on 30 April 2014.[147]

A guide for drafting sustainable soils legislation was developed by the International Union for Conservation of Nature and Natural Resources (IUCN).[148] The guide reminds that "soil legislation should acknowledge soil as a finite, largely non-renewable ecological element and include the procedures that enable appropriate policies to be formulated to protect the soils of the trading nations from unsustainable use".[149] It incorporates basic principles that should be reflected in soil legislation, among which are the precautionary and polluter pays principles. Precautionary approach is important to protect the soil environment because, in situations where there is serious or irreversible damage, measures to protect degradation will not be postponed due to lack of full scientific certainty. The polluters pay principle requires anyone whose activities cause or are likely to cause a loss of the ecological integrity of soil to bear the full cost of restorative measure. Related to this is the principle of prevention;

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[145] European Commission (2007), *Environmental Fact Sheet: Soil Protection- a New Policy for the EU,* European Commission. http://ec.europa.eu/environment/soil/pdf/factsheet_2007_en.pdf , accessed on 12 May 2015

[146] *Ibid*.

[147] European Commission, *supra* note 144

[148] The guide is intended to be used as a resource document for States to draw on or to reform existing legislation that protect the soil, and to establish a direction for the drafting of new national legislation for sustainable use of soil. Hannam & Boer, *supra* note 1

[149] *Ibid*., p. 25

> Prevention forms a prudent complement to the polluters pay principle (where the latter does not necessarily compel polluters to reduce their pollution by requiring them to internalize their costs). Preventive measures should not depend on the appearance of soil ecological problems; they anticipate damage, or where it has occurred, try to ensure it does not spread.[150]

A national legislative framework that incorporates these principles can play vital role in preventing harms caused on the soil by human activities, including floriculture. The threats that extensive use of pesticide and other agro-chemicals in flower production pose on the soil environment are noticeable, but the impact can be minimized or eliminated if effective precautionary and preventive measures are taken. There should be a legal ground that prioritizes protective measures over any activity that will likely have impact on the integrity of the soil. As floriculture, like any agricultural activity, can significantly impact the ecological integrity of the soil, undertaking environmental impact assessment should be considered. This helps to identify the nature of the risk and indicate mitigating measures.

Generally, activities that can threaten the ecological integrity of the soil environment should be subject to authorization.[151] Such authorization should only be granted where there is evidence that the activity will not cause or exacerbate soil degradation; the soil user takes all reasonable protective measures (including the application of best available soil conservation strategy); and soil standards are going to be or are complied with. Similarly, legislative measures that compel polluters to reinstate the damage that they caused on the soil and reduce their polluting activities will have significant contribution in any effort to prevent soil degradation.

[150] *Ibid*.
[151] *Ibid*., p. 75

States may either prefer to develop sustainable soil strategies with a minimum of legal regulation or a stronger regulatory-based law.[152] The predominant elements of these two strategies are indicated bellow:

Regulatory-based Strategies

- Development of statutory soil plans that prescribe legal limits and targets of soil and land use
- Issue of licenses or permits to control soil use
- Soil use agreements between the state and individuals, which set binding soil use standards
- The use of restraining notices where sustainable soil use limits are exceeded
- Persecution for failure to follow prescribed standards of sustainable soil use.

Non-regulatory Strategies

- Education activities and awareness programs for sustainable use of soil
- Soil ecosystem research, assessment and monitoring of soil use
- Financial support for soil research
- Extensive use of community participatory facilities
- Development of ecologically sustainable soil use standards and practices of self-regulation
- Development of soil resource management, protection and incentive based programs.

Adopted from Hannam & Boer [153]

Generally, well designed legal frameworks are necessary to prevent or minimize the risk of soil degradation.[154] They also lay the foundation for sustainable use of soil which refers to "the use of soils in a manner that preserves the balance between the processes for soil formation and soil degradation, while maintaining the

[152] *Ibid*., pp. 30-31
[153] *Ibid*., p. 31
[154] Hannam & Boer, *supra* note 138

ecological functions and needs of needs of soil".[155] Legislation may be used to prohibit or ristrict land use.[156] Accompanied to environmental impact assessment, for example, authorization to use a specific land may be denied if an activity poses risk to the integrity of the soil. The other important role of legislation is establishing efficient institutions that carry out important function in relation soil protection, including developing practical land management measures, ensuring effective compliance, monitoring the performance of land management programs, and proposing amendments to the law so that it remains effective. This important role of legislation is 'often underestimated'.[157]

7.4. International Law and Soil Protection

International legal responses to address soil degradation have been limited. Except the commitments that establish general obligations and some binding instruments [158] that relate, in one way, or another, to the use of land and its soil, there are no legally binding instruments which have, as their primary aim, specific measures to conserve, improve and rehabilitate soil, and prevent soil degradation. A general perception that soil is an inexhaustible resource and soil degradation did not raise transboundary problem might have contributed for relative absence of binding international legal rules on soil.[159] While the existing global binding instruments can assist in achieving sustainable use of soil, they are inadequate to manage the type and severity of soil degradation problems and do not include "sufficient range of legal elements that are needed to protect and manage land in a sustainable way".[160] In other words "non are sufficient in their own right to meet the requirements of international environmental law in relation to soil".[161] In addition

[155] Hannam & Boer, *supra* note 1, p. 93
[156] Hannam & Boer, *supra* note 38, p. 168
[157] *Ibid*.
[158] International environmental treaties relating to climate change, biodiversity, desertification, trade in hazardous wastes, endangered species, the ozone layer, and wetlands, such as the Convention to Combat Desertification (1994), the Convention on Biological Diversity (1995) and the Kyoto Protocol (1997).
[159] Shelton & Kiss, *supra* note 2, pp. 86-87
[160] Hannam & Boer, supra note 138, p. 169
[161] Hannam & Boer,*supra* note 5, p. 59

to this, they fail to provide specific guidelines important to reform or design national soil legislation.[162]

7.4.1. Binding International Instruments

Some multilateral agreements can play role in promoting sustainable use of soil, but the provisions tangentially address the problem of soil degradation. As noted above, these agreements do not establish specific rules for sustainable use of soil. One of the conventions that have soil protection role is the Convention to Combat Desertification that aims to prevent and reduce land degradation and rehabilitate partly degraded land, particularly in countries that experience serious drought.[163] 'Desertification' is defined as land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climate variations and human activities.[164] The Convention focuses on "physical process of land degradation" and fails to "adequately recognize soil as an individual ecological element, and it does not contain other elements to capture the rull range of legal principles and processes to protect and manage soil for its sustainable use".[165]

The Convention on Biological Diversity has the objective to conserve biological diversity, encourage the sustainable use of its components, and share the benefits arising out of the utilization of genetic resources fairly and equitably.[166] It requires States to conserve the biological diversity that exists in their territories and to use the resources in a sustainable manner. As soil is key component and ecological element, it will be futile to separately treat biodiversity conservation from soil protection.[167] Accordingly, States are supposed to conserve and sustainably use the soil. Apart from this, the Convention is concerned about biodiversity loss caused by human activities and one of the problem that results from these activities is soil degradation.

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[162] Hannam & Boer, *supra* note 138, p. 169

[163] United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly Africa, General Assembly, 12 September 1994. This Convention is ratified by Ethiopia on 27 June 1997. See http://www.unccd.int

[164] *Ibid*., Article 1(a)

[165] Hannam & Boer, *supra* note 5, p. 63

[166] The United Nations Convention on Biodiversity, 1992, Article 1

[167] Hannam & Boer, *supra* note 5,p. 64

Some international environmental conventions on hazardous chemicals and pesticides can also have importance in protecting the soil against degradation. These include the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the Stockholm Convention on Persistent Organic Pollutants. These Conventions impose global ban on a wide range of toxic and environmentally hazardous chemicals, and promote shared responsibilities and cooperation among parties that internationally trade in certain hazardous chemicals. The international regulation of hazardous chemicals will have contribution to soil protection as some of these can cause soil pollution and deteriorate the quality of soil.

7.4.2. Non-binding International Instruments

Some non-binding international instruments establish general guidelines for sustainable soil use.[168] The most relevant one is the World Soil Charter, adopted in 1981. It contains basic principles and guidelines that aim to improve productivity, conservation and rational use of soils, and promote 'optimum land use'. It encourages international cooperation in the rational use of soil resources and recognizes the responsibility of governments to ensure long term maintenance and improvement of soil productivity.[169] It acknowledges the dependence of humans on the land and the impacts of soil degradation on the economy and the environment.[170] Keeping the basic principles in the original document, the Charter was revised in 2015 in light of new scientific knowledge, especially with respect to issues like soil pollution and its consequences for the environment, climate change adaptation and urban sprawl impacts on soil functions.[171] The revised charter urges governments to promote sustainable soil management. It states that soil management is sustainable if

> the supporting, provisioning, regulating, and cultural services provided by soil are maintained or enhanced without

[168] Such as the World Soil Charter and the World Soils Policy
[169] Hannam & Boer, *supra* note 5, p. 61
[170] World Soil Charter, Adopted by the UN Food and Agriculture Organization, 25 November 1981, 21 FAO Conf. Res. 8/81, Principles
[171] Revised World Soil Charter, endorsed during the 39th FAO Conference in 2015, www.fao.org

> significantly impairing the soil functions that enable those services. The balance between the supporting and provisioning services for plant production and the regulating services the soil provides for water quality and availability and for atmospheric greenhouse gas composition is a particular concern. [172]

The World Soil Policy, adopted by the UNEP in 1982[173], is basically similar to the World Charter. Both instruments are recognized as the global 'soft law' for soil; though not legally binding "they have been influential in raising the profile of soil conservation as an international environmental management issue".[174] They serve as guideline materials for States to design domestic laws and policies, and call on governments to use sound principles of resource management, prevent soil erosion and degradation, and reduce the loss of farmland to non-farm purposes.

The elements of 'soft law' can be incorporated into binding international instruments and have mandatory characteristics creating obligations that must be observed by Member States. Now it is more than 30 years since the World Soil Charter and the World Soil Policy came into existence. The world is lacking comprehensive international convention on soil while the problem of soil degradation is becoming worse globally. These justify the need to introduce a new binding framework for soil that should be founded on clear understanding of soil problems, environmental management concepts and implementation mechanisms.[175]

Conclusion

Soil, a basis of territorial life and inherent part of biodiversity, is susceptible to chemical, physical and biological degradation. This vulnerability is particularly the case in African countries where climate and chemicals and biological degradation

[172] *Ibid*.
[173] In addition to the World Soil Policy, UNEP developed environmental guidelines for the formulation of National Soil Policies, and adopted an Action Plan on Drought and Desertification.
[174] Hannam & Boer, *supra* note 5, p. 61
[175] Hannam & Boer, supra note 5, p. 61

have been shown to have significant impact on the environment. This problem is mostly human-induced and caused by such human activities as agriculture, deforestation, manufacturing, mining, and overgrazing. Once the soil is exposed to degradation, its potential capability to produce ecosystem services can be lost or reduced. Soil degradation, being a serious problem in Ethiopia, has been mainly caused by erosion associated with deforestation that has been carried out massively to satisfy the needs of the growing population. Recent threats have emerged with extensive use of pesticides and fertilizers to raise agricultural food productivity and in flower production.

The main focus in this chapter has been flower production impacts on the soil derived from excessive application of pesticide and fertilizers. As indicated in Chapter two, flowers can be cultivated either directly on the soil or using growing media (hydroponics). Soil degradation is usually associated with the former while the latter is alternatively developed in response to environmental problems caused to the soil mostly due to pesticide use. In soil based cultivation, pesticides are used to disinfest the soil against pathogens. It is also used during the entire period of crop growth as there are possibilities of pest outbreaks. Fertilizers are applied to the soil to add nutrients and raise productivity. All these can expose the soil for pollution.

Using methyl bromide as illustration, the chapter narrated how pesticides applied to the soil before flower plantation can contaminate the soil and water sources, and threaten the environment. This chemical is effective to deal with most weed seeds and other organisms such as rodents and has been used widely, including in flower production. However, it is listed as ozone depleting substance in the Montreal Protocol and its production and use seized in 2015 in developing countries. [176] With its phase out, new chemistries and other alternatives have been introduced. However, adopting the alternatives into practice was found to be challenging mostly because of extra expenses and doubts about the effectiveness of the

[176] The use of methyl bromide phased out in developed countries by 2005 while it phases out in developing countries as of 2015. In all counties, quarantine and pre-shipment (QPS) are currently exempted from phase out. Apart from this limited exemptions may be granted on limited basis for "critical" and "emergency" uses.

alternatives. Despite discontents about the alternatives, examples for quality flowers production without the use of methyl bromide for soil fumigation can be found.

There is limited available information about the use of the chemical as soil fumigant in Ethiopia. A 2011 study indicates that was used in the flower Industry and it was expected that growers will gradually abandon its use because of increasing market pressure in Europe (Tamrat, 2011). Replacing the use of methyl bromide with environmentally sustainable methods is considered a necessary business requirement. The use of methyl bromide is also restricted by international certification schemes, such as GlobalGAP and MPS. As indicated in Chapter 8, Some Ethiopian companies are certified with the standards, however, their number is small and the majority of flowers exported from Ethiopia are destined to the auction where there is no requirement to adhere to the international standards. Though it was possible to confirm through interview that methyl bromide is not registered at the Plant Health Regulatory Directorate, it difficult to conclude beyond doubt that the use of the chemical seized in the Ethiopian flower industry. This is basically because, companies, as explained in Chapter Five, are allowed to import pesticides without following the formal registration procedure and there is weak regulation of pesticides in Ethiopia.

The chapter discussed two methods in environment friendly flower production that can significantly minimize soil degradation. It presented the experiences of companies in the Ethiopian flower industry in relation to the methods. The first was hydroponics that enables to eliminate the leaching of nutrients and pesticides to the soil. In Ethiopia, only a few companies introduced the method. They confirmed that the method helps to protect the soil in greenhouses from adverse impact of pesticides and fertilizers. Even if at the initial stage the production system involves more investment costs, better harvest is achieved. It reduced vulnerability to the pests and pathogens. Similarly, though only some progressed well, significant number of companies once took the initiative to introduce biological pest control methods. It is reported that through implementing the methods, the companies reduced the amount of chemical pesticide used in flower production. This has

significance for the protection of the soil and the overall environment against degradation.

However, both technologies can be expensive due to limited available knowledge and higher cost of skilled manpower. They also involve high initial investment costs and expenses, discouraging companies from introducing the method. The additional costs are said to be compensated or reduced in the long run. But there are lacks of confidences among growers about financial returns for the expenses incurred by engaging in good agricultural practices either through increased efficiency or increased market price. The management of the methods is sometimes challenging and some companies lack the capability to respond to new and unforeseen challenges.

Generally speaking, large foreign-owned farms have better economic performances and lesser rate of project distress compared to domestic-owned farms. They have market niche to the direct strand value chain which offers better price. The assumption has been that these companies are in a much better position and quickly adapt improved technologies. Nevertheless, this chapter indicates the incidence that large foreign-owned farms refrain from introducing some agricultural technologies. Accordingly, it stresses on the need for government driven method (either incentive or coercive) to encourage companies introduce technologies and engage in sustainable flowers production. It is also important effectively regulate the import and use of biological agents both to promote industry wide application and protect the environment.

The last issue of discussion in this chapter has been the application of national legislative frameworks and international agreements to govern soil degradation. The chapter indicated that both national legislation and international agreements fail to specifically address the problem leaving the issue to be regulated in fragmented way. Only some non-binding international instruments, such as the World Soil Charter and the World Soils Policy, establish general guidelines for sustainable soil use. They contain basic principles and guidelines that aim to improve productivity, conservation and rational use of soils, and promote ‘optimum

land use'. Managing activities that directly lead to the problem, legislations concerning waste disposal, pollution and pesticide regulation can somehow extend protection for the soil. However, the protections they extend for the soil are not adequate. Well-designed legislative frameworks are required to lay the foundations for sustainable use of soil and there by prevent or minimize the risks of soil degradation. In order to prevent harms caused by human activities, including floriculture, some basic strategies, such as licenses to use soil, soil use agreements between the state and individuals, binding soil use standards and legal measures against failures to follow prescribed standards, need to be considered.

Chapter Eight: Ethical Trading, Private Environmental Standards and the Floriculture Industry

Introduction

We turn to consider the value and importance of ethical trading and whether or not ethical trading has been successful. As outlined earlier in the thesis, in Ethiopia flowers are grown for export purposes and are mainly exported to Europe, either through Dutch auctions or directly to supermarkets/retailers. In the world flower market, the share of European supermarkets/retailers is increasing as they directly source flowers from growers in developing countries. The requirements that these retailers put on growers are strict, expressed in the form of quality and timely delivery. Retailers are pressured by customers and activists to source only from growers whose production process is sustainable, leading to the adoption of code of practices and certifications by producer companies. Within these broader contexts, the present chapter expounds two basic issues: the contribution of ethical trading and certifications in improving environmental standards (1); and the impacts of these trends on growers in developing countries (2).

Borrowing the analysis from ecological modernization theory, Chapter Three presented multilevel governance for environmental regulation. Within this form of governance different stakeholders, including companies, take part in environmental protection tasks. The main action to regulate environmentally undesirable behaviours comes from the government, but companies themselves take initiatives in achieving environmental protection goals. Recent trends suggest that there are growing interests in adopting voluntary environmental standards and participating in certification schemes. These are non-state systems of regulation distinguished by their voluntary nature and economically based incentives. While the preceding three chapters discussed government driven national and international regulation of environmental impacts associated with flower cultivation, this chapter focuses on providing insight into private environmental standards and certifications relevant to the sector. The chapter discusses the nature of the cut-flower value

chain and how actors in and out of the chain influence the behaviour of producers in developing countries.

Varying in origin, content and implementation procedures, private standards and certification schemes promote sustainable flower production practices. The principles they incorporate related to pest, waste, pollution, soil and water management can transform existing production processes to environmental friendly practices. These contributory roles of private standards and certification schemes are supported by some empirical evidences. This chapter indicates that some companies in the Ethiopian floriculture industry are with one or more certifications. The majority of them are also certified with Bronze Level Certificate of the EHPEA Code of Practice, evolved in the form of the floricultural industry's initiative to self-regulation. Some efforts to introduce good agricultural practices in the industry, discussed in Chapter Seven, can be associated with the certification schemes as well.

However, there are doubts in relation to implementation practices of private standards. Though there are differences between standards, the majority of them fail to provide wider room for workers and their representatives as well as NGOs to participate during implementation. The credibility of the certificates can thus be put into question. Some even went to the extent of arguing that companies in developing countries take part in certifications just to please retailers without implementing principles into practices. Apart from these, commercial requirements of buyers, such as short notice order and just-in-time delivery, sometimes affect code implementation leading producers to breach code principles.

Some producers, including in the Ethiopian floriculture industry, appreciate the role of private standards in building business reputation, improving production efficiency and opening international market opportunities. Nevertheless, there are challenges that developing country producers face to implement private standards, which is a requirement to join the direct strand floriculture value chain. This is mainly because product quality, environmental protection and labour welfare standards require producers to invest in new technologies and change production

processes. Yet these producers, particularly small holders, face limitations related to technical, financial and institutional capabilities. While compliance costs need to be compensated through increased price, it is doubtful that western customers will be willing to pay premium prices for environmental friendly products.

8.1. The Floriculture Value Chain

8.1.1. Basic features of the Floriculture Value Chain

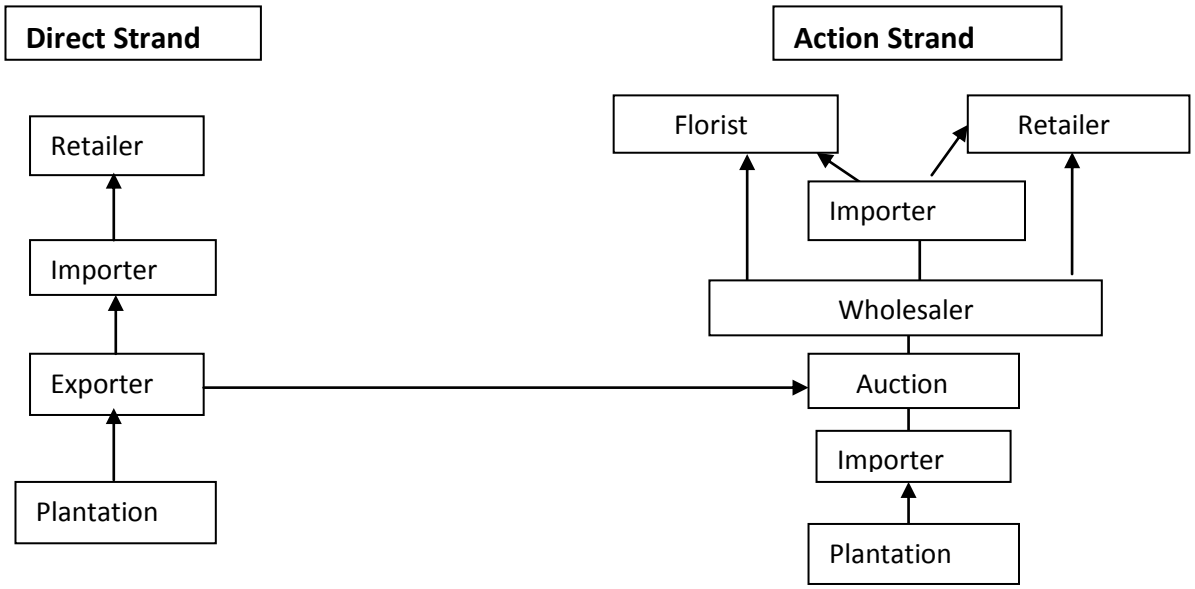
Economic globalization and liberalization have greatly facilitated global trade in goods and services. Global markets and the decline in regulatory barriers to international trade, major advance in communication technologies, and continuous decrease in transportation costs have led to the rapid globalization of production and trade.[1] Within the new pattern of productions, economic activities are dispersed across national boundaries. Firms in different territories engage in production, distribution and marketing before a single product reaches customers.[2] This "network of labor and production process whose end result is a finished commodity" is refered to as commodity chain.[3]

Also in floriculture, before a bunch of flower reaches the end user, various parties put labour at different stages.[4] Parties are involved in seed and input provision, farming, postharvest handling, transportation, marketing, distribution and retail. Depending on the circumstances some of these activities may be vertically integrated. For example, in Kenya large companies integrate production, export and import activities.[5] Flower growers obtain seeds and other inputs such as greenhouses, fertilizers, water, agrochemicals and packaging materials. Some of these supplies (e.g. greenhouses and agrochemicals) are imported and provided for

[1] P. Gibbon, J. Bair and S. Ponte, Governing Global Value Chains: An Introduction, *Economy and Society* (2008) Vol. 37, Issue 3, pp. 315–538; G. Gereffi, "The Organization of Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks" in G. Gereffi and M. Korzeniewicz(1994), *Commodity Chains and Global Capitalism*, Greenwood Publishing, pp. 95-122
[2] J. Bair, Global Capitalism and Commodity Chains : Looking Back , Going Forward, *Competition & Change* (2005), Vol. 9, No. 2, pp. 153–180
[3] T. K. Hopkins and I. Wallerstein, Commodity Chains in the World Economy Prior to 1980, *Review* (1986), Vol. 10, No. 1, p. 159
[4] L. Riisgaard and N. Hammer (2008), *Organised Labour and the Social Regulation of Global Value Chains*, Working Paper, Danish Institute of International Studies, www.cianet.org , accessed on 5 August 2013
[5] Ibid., p. 31

growers. Growers may directly purchase seeds from specialized breeders that are engaged in seed production and cuttings or may breed themselves. Growers play the main role of flower production. Flowers will be harvested and made ready for export. Transportation to the airport is the next activity in chain. Again this task can be carried out by growers themselves or a company engaged in this activity. After exporting to foreign countries, flowers are distributed through auctions or supermarkets. Other actors such as freight forwarders may be involved in a chain.

Figure 6: The Cut-flower Value Chain



Adopted from Riisgaard and Hammer (2008: 28)

There are two distinctive strands of cut-flower value chain, particularly in relation to trade between Africa and Europe.[6] In the first strand of chain, flowers are sold at actions/wholesale markets. This is the traditional market root for cut-flowers. Historically, the Dutch actions served as main channel through which flowers are distributed to European retailers. Wholesaler markets have been key players in other European countries, mainly in Germany, UK and France. In this strand of chain, the grower can directly sale at the auction where the import division at the auction receives the flowers, unpack and prepares the product for auctioning or import agents may be involved in the preparation of the product for auctioning.

[6] L. Riisgaard, Global Value Chains, Labour Organization and Private Social Standards: Lessons from East African Cut-flower Industries, *World Development* 37 (2009), pp. 326-340; B. Dinham (2008), Flowers – a tale of beauty and the beast, *Pestcide News 82*, December 2008, pp. 19–23.

However, there is a recent change in distribution channel with supermarkets directly sourcing from developing countries by establishing direct trade link with growers and import agencies, cutting out wholesalers and actions. The second strand of chain, therefore, involves direct sale to retailers (i.e. supermarkets). Though it may not replace the Dutch auctions entirely, the market share of supermarket chain is increasing.

8.1.2. Governance of the Cut-flower Value Chain

One of the aspects with respect to which every chain can be analysed is the governance structure.[7] The issue of governance relates to power relationship between economic agents involved in the conceptualization, production and distribution of goods in global industries.[8] Governance is about coordination or control within production networks fragmented and dispersed across geographic space and organizational boundaries of individual firms.

Gereffi identified two forms of governance structures: producer-driven and buyer-driven.[9] Producer-driven governance is found in capital and technology intensive sectors, such as automobiles, aircraft and electric machinery, in which lead firms control operations in house leaving labour-intensive functions to overseas suppliers. A typical example is the automobile industry in which big firms coordinate manufacturing of auto-parts in other countries. On the other hand, buyer-driven form of governance exists in more labour-intensive sectors. Companies (usually brand named) do not own production facilities and are increasingly engaged in out sourcing of products, which they sale in their stores or under their labels, from overseas suppliers.[10] This dichotomy is based on the assumption that power to govern chains rests on lead firms, which are

[7] Gereffi, *supra* note 1, pp. 96-97

[8] J. Humphrey and H. Schmitz, Introduction: The Issue of Governance in Value Chains, *IDS Bulletin*(2001), Vol. 32, No. 3, pp. 19–29; P. Gibbon, J. Bair and S. Ponte, Governing Global Value Chains: An Introduction, *Economy and Society* (2008), *Vol.* 37, Issue 3, pp. 315–338; Gereffi defines the concept as "authority and power relationships that determine how financial, material and human resources are allocated and flow within a chain" Gereffi, *supra* note 1, p. 97

[9] Gereffi, *supra* note 1, p. 97

[10] In the clothing industry, for instance, production is carried out by independent factories that make finished product based on the design and specifications provided by buyers and branded companies. The later are lead firms that mainly focus on designing, branding and marketing.

manufacturers in the case of producer-driven chain and retailers and/or marketers in the case of buyer-driven chain. Lead firms play determinant role in controlling global production networks.[11] Access and entry to developed countries market is dependent on entering into chains. Humphrey and Schmitz argue that "even when developed countries dismantle trade barriers, developing-country producers do not automatically gain market access, because the chains that producers feed into are often governed by a limited number of buyers".[12] These buyers define 'a set of parameters' that address issues including what is to be produced; how it is to be produced (such as the technology to be applied, quality system, labour and environmental standards); when it is to be produces; and how much it is to be produced.[13] The main motivating factor for lead firms to set parameters is risk avoidance.[14] Firms are conscious about reliability and on time delivery of products.

Due to the growing role of large retailers in direct sourcing of flowers from producers in developing countries, the floriculture value chain is more of characterized as buyer-driven.[15] In the chain, large retailers are the ones that play significant role in governance. One observable change in relation to this considerable market power of large retailers is a growing trend towards higher demand for product quality; consistency in volume; product variety and on time delivery. Apart from this, European supermarkets demand processes of production to be sustainable, i.e. produced without affecting the integrity of the environment and the interests of the society.[16] New patterns of consumption, media pressure, and campaigns by non-governmental organizations (NGOs) have generated consumers interests in questioning the conditions under which flowers are produced in developing countries. Retailers have "a valuable and ethically sensitive

[11] See Gereffi, *supra* note 1; Humphrey and Schmitz, *supra* note 8
[12] Humphrey and Schmitz, *supra* note 8, p. 20
[13] *Ibid*.; Gibbon & *et al*, *supra* note 8
[14] Lead firms strive to ensure product conformity with necessary standards related to quality, environmental safety and labour protection. This is partly due to a growing demand by customers and activists to guarantee product safety and compliance with labour and environmental standards at production cites of suppliers. See Riisgaard, *supra* note 6, pp. 326-340; S. Barrientos and S. Smith, Do Workers Benefit from Ethical Trade? Assessing Codes of Labour Practice in Global Production Systems, *Third World Quarterly* (2007), Vol. 28, Issue 4, pp. 713–729
[15] Riisgaard and Hammer, *supra* note 4; Riisgaard, *supra* note 6
[16] *Ibid*.

brand and consequently they are sensitive to campaigns in customer markets".[17] Consumers that are interested in the environmental and social dimensions of production are leading producers in developing countries to adopt a range of private social and environmental standards. The market is now characterized by the existence of a multitude of standards in the form of certification schemes, code of practices and a handful of market labels.

In contrast, the auction market channel is less strictly coordinated and the relationship is more of market-based type.[18] It is less driven by buyers and, accordingly, there is no strict requirement to adhere to social and environmental standards.[19] In other words, a range of standards are demanded to enter direct retailer chain while there is no such requirement to access the Dutch auctions. Nevertheless, Riisgaard notes that despite the absence of market pressure for adopting standards, most flowers supplied to the auctions comply with MPS. It is believed that obtaining MPS environmental certification helps to enhance reputation at the auction.[20] Information about participation in MPS-ABC, Fair Flower Fair Plant and MPS-Florimark are communicated to buyers.[21] This and other main social and environmental standards that apply for the cut-flower industry are summarized in Section 8.2.2 below. As compared to direct sale market, the auction market system is less complex, market information is easily accessible and prices are transparent. The nature of the market at the auction does not require growers to supply a large number of varieties.

Auctions still remain the most important market outlet for cut-flowers from East Africa, including Ethiopia.[22] Currently, the majority of flowers exported from Ethiopia reach European retailers passing through Dutch actions. This implies that most growers are not strictly required to adhere to standards and certification

[17] Riisgaard and Hammer, *supra* note 4, p. 31
[18] *Ibid*., p. 28
[19] A. Tallontire, C. Dolan, S. Smith, and S. Barrientos, Reaching the Marginalised ? Gender Value and Chains Ethical Trade in African Horticulture, *Development in Practice* (2005), Vol. 15, No. 3 & 4, p. 562
[20] Riisgaard, *supra* note 6
[21] Trade for Development Centre (BTC) (2010), *The European Market for Fair and Sustainable Flowers and Plants*, Belgian Development Agency, Brussels, p. 8
[22] Riisgaard, *supra* note 6

schemes. However, in the world flower market, the direct trade channel is growing, bypassing the auction strand. Also in Ethiopia, the percentage of flowers exported to large retailers is increasing gradually. Further growth of the floriculture industry will obviously depend on the ability to meet strict requirements set by European retailers and supermarkets.[23]

The expansion of direct retail by supermarkets is accompanied by challenges of joining chains for African cut-flower producers.[24] Complying with the requirements and standards of supermarkets demand organization and capability of suppliers. [25] In order to fulfil requirements related to consistency, product diversity and quality, firms in direct markets channel need to have higher capability in production, marketing and logistics than grower supplying to the auctions. The former likely have their own propagation facilities, are large in size (in terms of land under cultivation and number of employees) and use foreign experts.[26] These growers incure additional costs related to product specification and packaging. Related to this is the problem that growers face because of absence of written contract.[27] Supermarkets may change or cancel orders at any time before deliery, leaving growers insecure. These factors may restrict some producers in Africa and other developing countries from joining the direct retailer chain and force them to remain allied with auction markets. These issues are further discussed in Section 8.2.4 below

[23] DLV Plant (2011), *Handbook for Greenhouse Rose Production in Ethiopia*, p. 10, http://www.dlvplant.nl/nl/core/media/file/Handbook_Rose_Ethiopia(1).pdf , accessed on 6 August 2015

[24] Mulu Gebreeyesus and Tetsushi Sonobe (2009), *Governance of Global Value Chain and Firms ' Capability in African Floriculture*, United Nations University Maastricht Economic and Social Research and Training Centre on Innovation and Technology (UNU-MERIT) and National Graduate Inistitute for Policy Studies (GRIPS), Japan; Angela Hale and Maggie Opondo, Humanising the Cut-flower Chain: Confronting the Realities of Flower Production for Workers in Kenya, *Antipode* 37(2): 301–23, 2005

[25] Supermarkets have very strict requirement related to quantity of products, product characteristics such as stem length and bud size, vase life guarantee (7 days in many supermarkets), high performance logistics, and long-term planning. See BTC, *supra* note 21, p. 7

[26] Gebreeyesus and Sonobe, *supra* note 24, 19.

[27] Hale and Opondo, *supra* note 24, p. 317

8.2. Ethical Trading, Private Standards and Self - Regulatory Mechanisms

8.2.1. What is Ethical Trading?

Through influencing sourcing strategies of lead firms, actors, such as customers and NGOs, play indirect role in chain governance.[28] Media pressure and NGO campaigns helped to generate considerable consumer interests in employment conditions and environmental practices of cut-flower production in developing countries. Consequently, the demand for ethical trade practices, which refers to "sourcing of products from companies guaranteeing core labour and human rights standards to their workforce", has increased.[29] The concept also includes environmental issues such as responsible forest management and sustainable fisheries.[30] This implies that companies in developing countries need to observe labour rights, abolish child labour and introduce sustainable environmental practices to engage in the global cut-flower market.

Supplying companies take initiatives to improve their environmental and social performances through either implementing code of practices or/and participating in labelling initiatives. The former set out principles and standards that a company implements to regulate its environmental and social impacts, while the latter is independently managed written assurance used to communicate information to customers in relation to social and environmental conditions under which goods are produced. Whichever way supplying companies follow, the main driving reason is joining production networks and getting access to markets, mainly in Western countries.

[28] Humphrey & Schmitz, Supra note 8; N. M. Coe, P. Dicken, and M. Hess, Global Production Networks: Realizing the Potential, *Journal of Economic Geography* (2008), Vol. 8, No. 3, pp. 271–295
[29] Mick Blowfield, Ethical Trade: A Review of Developments and Issues, *Third World Quarterly* (1999), Vol. 20, No. 4, p. 753; Barrientos & Smith, *Supra* note 14; See also Riisgaard, *Supra* note 6
[30] *Ibid*.

8.2.2. Private Standards and Certifications

8.2.2.1. International Standards in the Flower Industry

With the growing dominance of supermarkets and large retailers international private standards become key instruments for governing the floriculture value chain. Initially, the issues that the standards addressed were related to chemical usage, environmental management, postharvest handling and product traceability, which are all aimed at protecting the health and safety of northern customers.[31] The social components related to workers' welfare were added more recently.[32] Generally, there are at least 16 different social and/ or environmental standards and code of conducts for the flower industry.[33] Some of these include: European Retailers Producers Working Group for Good Agricultural Practice (EUREPGAP), the British Retail Consortium (BRC), Milieu Project Sierteelt (MPS), International Code of Conduct for Cut-flowers (ICC), Ethical Trading Initiative (ETI) Base Code and Fairtrade for Flowers and Plants.

The standards differ in origin, content as well as implementation procedures.[34] Some of them, for instance MPS and EUREPGAP, are launched by producer groups in the EU and are called business-to-business standards, not communicated to customers. Others, such as Fairtrade, Fair Flower Fair Plants and Flower Label Program originated from NGOs and trade unions, and are consumer labels. A number of supermarket and garden centre chains also introduced their own private labels based on standards like ETI and MPS-ABC to communicate the production process of an item. Apart from these, producers' associations in developing countries initiated standards in the form of industries' effort to self-regulation. Examples include Kenya Flower Council Code of Practice, FlorEcuador (Ecuador), Floverde Standard (Colombia), and EHPEA Code of Practice (Ethiopia). The latter is discussed in the up-coming section.

Some standards are exclusively focused on the issue of environmental protection. A good example is MPS-ABC certificate, which is dominant in Europe and has been

[31] Hale and Opondo, *supra* note 24, p. 307
[32] *Ibid*.
[33] Riisgaard and Hammer, *supra* note 21, p. 29
[34] BTC, *supra* note 21

running since 1995.[35] In order to be awarded with this certificate, participants' usage of fertilizers and crop protection products, energy consumption and waste management will be calculated over four week periods. Participants keep records, and based on the total number of points achieved, MPS awards qualifications A, B, C or D four times a year. [36] The rating scale ranges from 0 to 110. Overall consumptions of a grower are compared with that of growers producing similar crops in similar conditions. Depending on this method, companies with the lowest usage gain the highest score. MPS-A qualification is awarded for the most environmentally friendly cultivation. MPS-D will be awarded for participants that submitted records for three successive periods or when they score less than 10 points after submitting records for 13 periods. Companies normally start with MPS-D and gradually upgrade their status. MPS-ABC environment management certificate is required by retailers, especially in Europe. Results are also transferred to the auctions to be displayed on the auction clock. In addition to this marketing advantages that growers might gain by participating in this scheme, image building and cost saving through conscious use of resources (i.e. crop protection products, fertilizers, energy and water) are cited as benefits.[37]

The main focus of some specific standards is on employment safety and welfare. MPS-Socially qualified certificate, one of MPS codes, incorporates a number of requirements concerning employment conditions.[38] It is developed based on universal human rights and international labour organization conventions. Some of the requirements of the code include respecting the right of employees to join trade unions, collective bargaining, freedom of association, equal pay for equal work, and protection against discrimination on any ground and harassment. It also has requirements in relation to forced labour, age, wage, working hours, leave, occupational safety and health, use, handling and storage of pesticide, and environmental protection. Similar kinds of requirements are stated in Fairtrade

[35] Ibid., p. 5; J. Wijinands, Sustainable International Networks in the Flower Industry Bridging Empirical Findings and Theoretical Approaches, *Scripta Horticulturae* (2005), No. 2, p. 27
[36] Information retrieved from official website of MPS, www.my-mps.com
[37] *Ibid.*
[38] *Ibid*.

Standard for Flowers and Plants.[39] This standard demands growers to take safety measures, such as training in safe use and handling and use of effective personal protective equipment, which is important to protect workers against pesticide hazards. It requires that workers should not be exposed to pesticides during application. In relation to freedom from discrimination, Fairtrade Standard prohibits termination of woman's employment during pregnancy or maternity leave, except on unrelated grounds. Unlike other standards, Fairtrade introduced a different form of price arrangement for certified products and a benefit scheme. In floriculture, Fairtrade premium (10% of each sale) will be added to prices negotiated between growers and buyers. This additional payment will be channelled to communal funds for workers and farmers and invested to improve their social, economic and environmental conditions. Decisions in relation to how the premium is used are made by a Joint Body of elected workers and management representatives, in consultation with workers.[40]

Like MPS-Socially qualified and Fairtrade Standards, Ethical Trade Initiative (ETI) base code incorporates a number of principles important to protect workers' rights and interests.[41] Founded on ILO Conventions, most of their requirements are similar with ILO standards. Apart from this, ETI Base Code demands employers to assist workers to form independent and free association where law restricts the rights. Interestingly, it demands wages always to be enough to meet basic needs. The Code protects workers against forced overtime. Where workers agree to work overtime, it should not exceed 12 hours per week, should not be demanded on a regular basis and should always be compensated. ETI Base Code is not a certificate scheme, however companies may receive certificate of compliance from independent certification and auditing companies.[42]

Some codes and certificates are comprehensive covering wider issues of sustainability. GlobalGAP (together with its benchmarked certification schemes such as MPS-GAP and EUREPGAP) and Fair Flowers Fair Plants are in this category.

[39] See www.fairtrade.net
[40] BTC, *supra* note 21, p. 54
[41] ETI Base Code, http://www.ethicaltrade.org/eti-base-code
[42] www.ethicaltrade.org

GlobalGAP is awarded for growers that comply with specified standards related to safe production methods, responsible use of resources and welfare of employees.[43] The standard several and detailed requirements related to worker health, safety and welfare; waste and pollution management; recycling and re-use; environment and conservation; product traceability and segregation; propagation material; soil management; fertilizer application; irrigation, integrated Pest Management; use and storage of plant propagation materials; soil and substrate management; and hygiene and security measures during Harvest. MPS-GAP and EUREPGAP are basically similar to GLOBALGAP, and are officially equivalent to the later. Having both social and environmental components, the other standard in this group is Fair Flowers Fair Plants which is a multi-stakeholder initiative promoting sustainable cut-flower and potted plants production. Its social component requires growers to meet the requirements of the International Code of Conduct (ICC) base code for the production of cut-flowers, foliage and pot plants while the environmental component refers to an achievement of at least MPS-A or a comparable level.[44]

Some companies in the Ethiopian floriculture industry are also with certificates of international private standards. Currently, 9 firms hold Certificates of Fairtrade [45] while about 19 firms participate in MPS-ABC Certification.[46] Apart from this, 12 firms are certified with Fair Flower Fair Plants.[47] There are also firms that participate in MPS-SQ, GLOBALGAP and similar certifications. There is lack of up-to-date, complete and accurate list of companies and the certificates they hold,

[43] GLOBALG.A.P. Integrated Farm Assurance Flowers and Ornamentals, Control Point and Compliance Criteria, English Version 4.0, Valid from March 2013, www.globalgap.org

[44] www.fairflowerfairplants.com

[45] These are AQ Roses, Herburg Roses, Klaver Flowers, Lafto Roses, Linssen Roses, Red Fox Ethiopia, Sher Ethiopia, Yassin Legesse Jonson- Sunrise Flowers, Ziway Roses. Information retrieved from Fairtrade International official website, www.fairtrade.net , accessed on 15 April 2016

[46] A complete list of firms participating in MPS is not currently available from MPS-ABC website. After searching the names of companies in www.my-mps.com (accessed on 15 April 2016) 19 Ethiopian companies were found certified with MPS. Almost all of them (except three) hold 'A' status. These are: Enyi Ethio Roses, Florensis Ethiopia, Maranque Plants (C), Marginpar Ethiopia, Oij Roses Ethiopia, Rainbow Colors, Roshanara Roses (B), Supra Floritech, Tana Flora, Tinaw Business, Herburg Roses, Sher Ethiopia, Klaver Flowers, Linssen Roses, Red Fox Ethiopia (C), Sunrise Flowers-Yassin Leggese Johnson, Ziway Roses, Minaye Flowers, and Dugda Floriculture Development.

[47] These are AQ Roses, Braam Roses, Dugda Floriculture Development, Herburg Roses, Holla Roses, Linssen Roses, Marginpar Ethiopia, Minaye Flowers, Only Roses, Sher Ethiopia, Sunrise Flowers-Yassin Leggese Johnson, and Tinaw Business. www.fairflowerfairplants.com , accessed on 15 April 2016

though. Some firms participate in more than one certification scheme. For example, Sher Ethiopia (Afriflora) has obtained certification for MPS-ABC, MPS-SQ, Fairtrade and Fair Flower Fair Plants. [48]

A survey conducted in 2010 covering all operational firms indicated that 28 firms (amounts to 36 %) were with one or more certificates of standards (such as MPS, GLOBALGAP, Fairtrade and Fair Flower Fair Plants).[49] The majority of these firms were fully foreign owned or joint ventures. The study indicated that while large, older and foreign owned firms are more likely to adopt standards, market roots (direct sale or auction) have no significant contribution in terms of standard compliance. This finding contravenes with the assertion that firms supplying directly to supermarkets or retailers adopt standards better than those supplying to the auctions. Generally, participation in any certification scheme is not a mandatory requirement for supplying products to the auctions, therefore there is no real market pressure to adopt standards. Yet, a number of auction suppliers adhere to one or more standards to enhance business reputation.[50] It is estimated that about 80% of flowers supplied to the auctions are produced by firms that participate in MPS-ABC certification scheme.[51]

8.2.2.2. EHPEA Code of Practice: a Form of Industry Self-Regulation

The majority of standard initiatives are from Europe, but, in recent years, a variety of standards have been initiated in producer countries. Associations in countries such as Colombia, Ecuador, Kenya, Ethiopia and Uganda now have their own standards. In March 2006, the Ethiopian Horticulture Producers Exporters Association (EHPEA) took the initiative to develop a Code of Practice with the support of the Ethiopian-Netherlands Horticulture Partnership Program. A team

[48] www.afriflora.nl; Other examples of Ethiopian growers that comply with more than one certificate include AQ Roses (www.rosaplaza.nl), Minaye Flowers (www.minayeflowers.com), Ziway Roses (www.hollaroses.com), Herburg roses (www.herburgroses.com)and Linssen Roses (www.linssenroses.com).

[49] 25 firms were certified with MPS while 4 firms are with GLOBALGAP, and 10 with other private labels such as British Retail Consortium (BRC), Fairtrade, or Ethical Trading Initiative (ETI). Mulu Gebreeyesus (2014), *Firms' adoption of international standards: Evidence from the Ethiopian floriculture sector*, UNU-MERIT Working Paper Series, ISSN 1871-9872, Version 5, January 2014, p. 10

[50] BTC, supra note 21, p. 7

[51] *Ibid.*

comprising EHPEA members and local stakeholders has taken into consideration the needs of the industry and concerns of the Ethiopian society in relation to environmental protection and worker's welfare. The code was launched in June 2007 with the objective of improving the overall performance and competitiveness of Ethiopian floricultural farms. It, among others, aims to contribute to: [52]

- long term economic viability of the sector;
- implementation of sustainable working practices and, at least, minimum labour conditions;
- responsible environmental management;
- healthy industrial relations; and
- protection of consumer health and safety.

The implementation of the Code is believed to enhance reputation and competitiveness of the Ethiopian flower sector at the international market. The Code introduced voluntary self-regulation into the sector and is "designed to address market and civil society concerns about standards for social and environmental performance in the sector and also guide the sustainable development of the sector".[53]

Like the Code of Practice of Floriculture (introduced by Regulation No. 207/2011), discussed in Chapter Four, EHPEA Code of Practice established a certification system with Bronze, Silver and Gold Levels.[54] Similar kinds of requirements are also found in both Codes for each level of certificate. The requirements in the EHPEA Code of Practices, however, are more elaborated and detailed. The Bronze Level sets the minimum acceptable standards in order to engage in commercial flower production. The majority of the requirements at this level relate to safe working conditions and protection of the environment as required by the laws of Ethiopia.[55] For example, companies must not purchase, store or use internationally banned

[52] EHPEA Code of Practice for Sustainable Flower Production, Version 4, Issue Date January 2015, p. 7, www.ehpea.org
[53] *Ibid*., p. 5
[54] The Code of Practice of Floriculture, discussed in Chapter Four is introduced by the government and is issued in the form of Regulation (No. 207/2011) by the Council of Ministers in 2011. It is preceded by the EHPEA Code of Practice which was issued in 2007.
[55] EHPEA Code of Practice, *supra* note 52, p. 11.

products and unregistered pesticides in accordance with the Pesticide Registration and Control Proclamation (No. 674/2010). They also need to observe minimum labour standards set in the Labour Proclamation (No. 377/2003). Apart from these, companies are required to measure and evaluate their water, pesticide, fertilizer and energy consumptions. They need to put in place basic management and farm auditing systems important to implement sustainable practices.

Basically, the Silver Level requirements are internationally recognized standards for good agricultural practices that provide protection for the environment and workers. This level of certificate is officially bench marked to GlobalGAP.[56] In order to certify companies with this level, the Bronze level requirements need to be fulfilled. In addition, companies must ensure that pest management is achieved with minimum use of pesticides and impact on the environment; protect the soil from degradation and erosion; use water resources responsibly; improve waste management and disposal procedures; and proactively encourage workers to form trade union and engage in collective bargaining. In order to be certified with Gold level, farms are expected to be involved in corporate social responsibility, environmental conservation, product quality management and sector development.[57] Also compliance with the requirements of the Silver Level is mandatory.

The Code states that EHPEA, in consultation with stakeholder and by tender process, will appoint an internationally accredited audit entity for independent verification of compliance with requirements.[58] This entity is expected to employ internationally recognized and acceptable procedures and practices during auditing. Since 2007 the auditing has been performed by an international company head quartered in the Netherlands called Control Union Certification (CUC).[59] The request for audit must come first from a company interested to participate in the

[56] *Ibid*. p. 12; EHPEA Silver Level in Ethiopia Successfully Benchmarked for GLOBALG.A.A. Integrated Farm Assurance Standard Version 4, 25 February 2015, http://www.globalgap.org/uk_en/media-events/news/articles/EHPEA-Silver-Level-in-Ethiopia-Successfully-Benchmarked-for-GLOBALG.A.P.-Integrated-Farm-Assurance-Standard-Version-4/ , accessed on 13 April 2016.
[57] EHPEA Code of Practice, *supra* note 52, p. 12
[58] *Ibid*. p. 13
[59] Interview with Mrs. Helina Getachew, Training Department Head, EHPEA, 27 July 2015

certification scheme. EHPEA provides assistance in the form of trainings that help companies meet requirements for each level.[60] Then primary audit will be performed by the internal auditor that the company appoints as required by the Code. An external audit (by CUC) will only be carried out after an assessment is made on the initial audit report.[61]

During external auditing, a variety of sources of evidence, including documents, records, farm facilities, equipment and testimony of workers can be used. Details about how, when and with which workers interview can be held is provided in the Code of Practice document.[62] The auditing company visits production sites upon appointment.[63] According to Mrs. Helina Getachew, EHPEA's Training Department Head:

> the external auditors go through greenhouses and randomly interview any worker. A representative from the EHPEA can also be sent with CUC to observe the auditing processes. However, neither this representative nor farm managers will be present during interview sessions. The auditors investigate whether the company applied for certification fulfils the requirements for the specific level.[64]

Each farm will be audited annually and, based on the result of the audit, will be issued with certificate of compliance with a specified level. A Certificate (at all levels) once issued will remain valid for a year starting from the date of the certification decision. [65] In order to maintain the status of certification, farms are expected to apply for and be audited within four months prior to the expiry date of the awarded certificate.[66]

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[60] *Ibid.*
[61] *Ibid.*
[62] EHPEA Code of Practice, supra note 52, p. 11
[63] Interview with Helina Getachew, *supra* note 59.
[64] *Ibid*.
[65] EHPEA Code of Practice, supra note 52, p. 32
[66] *Ibid*.

Initially, twenty one companies took part in a joint pilot training for the implementation of the Code of Practice.[67] Farm managers, agronomists and selected workers were provided with trainings on farm safety, environmental impact assessment, pesticide use, record keeping, first aid and internal auditing. In 2009, ten of these companies managed to become the first to get certified.[68] During the award of the certificate a higher governmental official expressed his view towards the code: "the preparation of a document is an important first step … but the potential benefit to the sector can only be realized when the code is fully implemented by all flower exporters".[69] The former president of the Association, Mr. Tsegaye Abebe, was hopeful that in the near future many companies achieve compliance with the code. He said "we now know that implementation is possible… we have developed a strong base of experience from which other farms may benefit and achieve compliance in the coming months".[70] In 2010, 63 companies (out of 67 companies) were certified with the Code of Practice following an industry wide training.[71]

By the end of 2015, eight years after the launch of the Code, there were 55 companies certified with bronze level (not renewed), 17 companies certified with silver level, and 5 companies certified with Gold level certificates.[72] Despite the Code of Practice's encouragement to move on to Silver and Gold levels, the number of companies certified with these levels remained insignificant. This issue was brought to the attention of EHPEA Training Department Head during interview and the response was that the voluntary nature of the Code and its limited significance for export market niche discourage companies to participate in the levels.[73] EHPEA Code of Practice is not yet a market level, adhering to this Code will not have direct impact on getting access to the international market. Companies simply participate

[67] Gebreeyesus, *supra* note 49, p. 9
[68] These were ET Highland Flora, Maranque Plants, Florensis, Ethio-Agri CEFT, Red Fox Ethiopia, Ethiopia Cuttings, Lafto Roses, Olij (Avon) Roses Ethiopia, Dunga Floriculture and Minaye Flowers. Helina Alemu, "Industry Code Gets First Batch Effecters", Addis Fortune, Local Newsletter, Published on March 01, 2009, http://www.addisfortune.com, accessed on 22 December 2015
[69] Mr. Tefera Derbew, Former Minister at the Mastery of Agriculture and Rural Development. *Ibid*.
[70] *Ibid*.
[71] Gebreeyesus, supra note 49, pp. 9-10
[72] Interview with Helina Getachew, supra note 59.
[73] *Ibid.*

in the certification scheme to improve their social and environmental performances and easily comply with the requirements of internationally recognized standards, such as GLOBALGAP and MPS. The Department Head explains that some companies lack commitment when it comes to certification and there should be a government driver mechanism to encourage compliance.[74] She says that there would have been improvements if the Code of Practice of Floriculture Regulation was fully implemented. But it is now more than three years since the Regulation was issued but did not enter into force.

Preliminary tasks were performed to assist companies meet the Bronze level requirements of the Regulation by December 2015. EHPEA together with the Ministry of Environment, Forest and Climate Change (MoEFC) carried out a baseline assessment on companies' level of compliance. According to the information from MoEFC, there are a number of irregularities with regards to environmental performances of companies and the majority of them lag behind what is required for Bronze Level Certificate in the Code of Practice.[75] Some problem areas include: failure to treat effluents leading to contamination of water resources; lack of company level environmental policies and units; inability to provide standard protective equipment for employees especially for those engaged in chemical spraying; limitations to perform environmental risk assessments; and absence of plans and facilities to dispose solid wastes. About 20 companies from 4 clusters were covered by the study. Compared to the overall size of the industry, the study covered quite significant numbers of companies. Despite the above irregularities and compliance problems, however, the majority of the companies (77) are already certified, putting the credibility of the EHPEA Code of practice certification processes into question. As indicated from the outset level requirements are basically similar in both Codes.

[74] *Ibid.*

[75] Mrs. Hany Ezedin Mohammed, Monitoring and Control Expert, Ministry of Environment, Forestry and Climate Change, 19 August 2015 Mr. Wondimneh Abreham, Monitoring and Control Expert, Ministry of Environment, Forestry and Climate Change, 19 August 2015

8.2.3. The Contributions of Private Standards for Environmental and Social Sustainability

The practice of sourcing products only from companies with good environmental and social standards can bring benefits to developing counties' people by positively influencing production processes. This practice is accompanied by private, non-state mandated standards that address critical environmental concerns and poor working conditions of men and women employed in the floriculture sector. There is a deep rooted believe that private standards play significant role through improving production and management techniques; leading producers towards better social and environmental performances and signalling level of compliances to global buyers.[76]

Some empirical studies also confirm that private standards can lead to improved environmental and labour conditions. Leipold and Morgante investigated into the Kenyan flower industry and found out that there are recent improvements in Kenya in relation to labour conditions (except wages that are significantly below a living wage) and environmental footprints.[77] Farmers increasingly introduced organic methods of pest control, reduced water consumption (through water recycling and rainwater collection), and improved waste disposal systems. The research acknowledges the increasing importance of ethical standards and labels by flower farms, such as the Fairtrade, GlobalGAP, MPS and KFC. Western consumer pressure combined with trade union action significantly contributed for the improvements. Similarly, a case study in Ecuadorian floriculture industry finds that Fairtrade Certification plays "critical role" in addressing pesticide-related environmental and

[76] Blowfield, *supra* note 29, Jaffee and Henson note that "rising standards serve to accentuate underlying supply chain strengths and weaknesses and thus impact differently on the competitive position of individual countries and distinct market participants". S. Jaffee and S. Henson (2004), *Standards and agro-food exports from developing countries: Rebalancing the debate*, Policy Research Working Paper No. 3348, The World Bank, Washington, DC; According to Maertens and Swinnen, empirical evidences indicate that costs incurred to implement standard are paying in the long term; "the cost of non-compliance with standards exceeds by far the cost of compliance". M. Maertens and J. F. M. Swinnen (2006), *Standards as barriers and catalysts for trade and poverty reduction*, Paper presented at the 26th Conference of International Association of Agricultural Economics Conference, Queensland, Australia, p. 2

[77] The findings are based on field visits in August and September 2010. Bruno Leipold & Francesca Morgante, The Impact of the Flower Industry on Kenya's Sustainable Development, *International Public Policy Review* (2013), Vol. 17, No. 2, pp. 1-31, accessed on 20 August 2015.

worker-health problems.[78] The study suggests that the labour and environmental performances of Fairtrade certified flower farms exceeds the minimum legal requirement established in the law and industry norms though export flower production may not be environmentally sustainable due to intensive use of hazardous chemicals. Likewise, Riisgaard concluded that implementation of standards (specifically, Fairtrade) assisted workers to strengthen their unions and become more influential on matters that can affect their interest.[79] He indicated that the standard played role in changing the perception that management has towards unions.

Nevertheless, contrasting conclusions were reached in some researches that question the effectiveness of code of practices in improving labour conditions.[80] Barrientos and Smith assessed the impact of ETI on labour conditions and concluded that code of labour practices play limited role in improving labour conditions.[81] They found some positive contributions that codes have for outcome standards such as health and safety policies, living wages and working hours. However, they argue that compliance with these standards will less likely bring fundamental change in embedded labour relation or social norms. Code of labour practices have less impact on process rights which focus on freedom of association and the right to collective bargaining. Mixed findings about the roles of private standards might have resulted due to different natures of standards studied by the researchers. It can also be due to different socio-political contexts which influence companies and the implementation of codes.

There are differences on the extent to which code of practices and private standards allow the involvement of workers, unions and NGOs in monitoring.[82] The majority of the standards simply incorporate provisions that demand firms to guarantee freedom of association, collective bargaining, awareness raising on

[78] Laura T. Raynolds, Fair Trade Flowers: Global Certification, Environmental Sustainability, and Labour Standards, *Rural Sociology* (2012), Vol. 77, No. 4, pp. 493-519
[79] Riisgaard, *supra* note 6, p. 332
[80] Barrientos and Smith, *supra* note 14; Hale and Opondo, *supra* note 24
[81] Barrientos and Smith, *supra* note 14
[82] Riisgaard, *supra* note 6, p. 331

workers' rights, regular employment and work contract.[83] Non-existence of adequate room for workers' and their associations' participation in implementation of code of practices is a common observable problem.[84] A typical example could be MPS-ABC that mainly depends on data produced by growers with regards to their crop protection agents, fertilizers, energy and water consumptions. Though audits are carried out before the award of the calculated qualification and to verify that the information and data provided by the participant are correct, it is not clear what roles that workers and union have in the processes.[85] The company may be subjected to visual inspection, but every year not more than 40% of participating companies are audited while only half of these are full audits.[86] Different from this, standards like Fairtrade and MPS-GAP are accompanied by on-site audits that allow workers to take part in providing information about production processes and facilities. For instance, in Fairtrade system there are audits performed to check compliances with relevant Fairtrade standards.[87] As part of the certification processes, a third part auditing body called assurance provider (FLOCERT) reviews documentation, performs individual as well as group interviews and physically inspects facilities and processes. Where there is plan for interview, fairly representative workers are elected using samples methods by the auditor.[88] In the majority of cases audits are performed on agreed dates except in the cases of unannounced audits.[89] The latter is undertaken when new and reliable information becomes available that indicates 'fraud' or 'critical deviation from the standard'. It may also be performed on the sites of some randomly selected producers or high-risk operators. These kinds of audits allow auditors to assess what is happening during a typical day, different from a purposely created artificial environment.

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[83] *Ibid*.
[84] Barrientos and Smith, *supra* note 14, pp. 715-716
[85] MPS Sustainable Quality, Certification Scheme MPS-ABC, Date of release 6 February 1995, Revised on 29 April 2015, 2015, www.my-mps.com
[86] *Ibid*.
[87] Fairtrade International, Fairtrade International Requirements for Assurance Providers, Version 1.1, www.fairtrade.net , accessed on 15 April 2016
[88] The sampling method and sample sizes are provided in Fairtrade International Requirements for Assurance Providers, Version 1.1, Part C. For example, among workers whose number ranges between 101-500, at least 20 persons should be interviewed.
[89] There is an initial audit before certification, a renewal audit every 3 years and a surveillance audit in between this cycle. See Fairtrade International Requirements for Assurance Providers, *supra* note 95, Part C.

Some research indicates various incidents of Implementation problems in relation to private standards.[90] Blowfield argues companies in developing countries launch codes just to please western customers.[91] Some companies pretend as if they are responsible towards the environment and the community while they fail to implement code principles into practice on their sites of operation. In some cases, they fail to produce implementation reports. He also questions the existence of independent verification mechanisms. Trade unions and environmental groups demand for independent monitoring and verification of company codes and also public access to audit reports.

Commercial requirements of buyers sometimes affect implementation of environmental and labour standards.[92] Humphrey and Schmitz argue that though lead firms can provide best practices and hands-on advice important to improve production processes and raise skill, they are very demanding with regard to reducing cost, raising quality and increasing speed.[93] For example, short notice order sometimes put producer companies in difficult situations to choose between accepting orders and breaching code principles. If they opt for orders, they need either to increase working hours beyond which codes and laws specify or intensively use casual and contract workers which is again restricted in codes.

Riisgaard explains how the dominant role played by European supermarkets affects compliance with standards.[94] He notes that supermarkets are engaged in just-in-time ordering. By setting this condition they want to avoid risks related to storage and costs and, consequently, flowers need to be delivered at the right time to the right location. Since it is only after confirmation of final order that flowers are picked, sorted, packed and delivered to airports, growers will be in a situation where they cannot be sure about the number of employees they need and the length of hours that the employees work. In other words, there is pressure on growers to cut labour costs and keep flexible workforce, which may entail to lack of

[90] Blowfield, *supra* note 29; Hale and Opondo, *supra* note 24
[91] Blowfield, *supra* note 29
[92] Hale and Opondo, *supra* note 24; Riisgaard, *supra* note 6; Humphrey and Schmitz, *supra* note 8; Barrientos and Smith, *supra* note 14
[93] Humphrey and Schmitz, *supra* note 8
[94] Riisgaard, *supra* note 6

job security. They employ large number of temporary work force and/ or coerce employees to work overtime. These purchasing practices of Western retailer firms interfere with developing country producers' effort to engage in responsible practices. Hale and Opondo argue that UK supermarkets' demands are conflicting: "... on the one hand growers are asked to find ways of ensuring that workers' rights are being respected and on the other hand they are still required to meet the stringent demands of the production process, which puts huge pressure on the workforce".[95] The pressure ultimately leads to violations to workers' rights. Many workers are hired on a casual, low paid basis and with no employment contracts".[96] These pressures of supermarkets directly link to some labour rights abuses, such as compulsory over time.

As the broad and critical issues addressed in private environmental standards are considerable, their contributory role in improving environmental performance of firms could have been significant. The limitations and factors that affect their implementation might cast doubt on their effectiveness. In relation to these issues, there is no research conducted in the context of the Ethiopian floriculture industry. Therefore, it may be difficult to provide clear picture about the contribution of standards and self-regulatory schemes for promoting sustainable flower production in the industry. As indicated in the preceding chapters, there are some initiatives to introduce sustainable flower production practices, such as biological pest control mechanisms and wastewater treatment. Some of the companies that took the initiatives are certified with standards like MPS and Fairtrade. Examples include Minaye flowers, Sher Ethiopia, Herburg, Tinaw, Roshanara and AQ Roses.[97] Even if it is not conclusive, it can be said that such efforts might have resulted from participation in certification schemes. In other words, private environmental standards to some extent fuelled improvements in the ecological and human impact of flower production in Ethiopia.

[95] Hale and Opondo, *supra* note 24, p. 317
[96] *Ibid*.
[97] EHDA (2012), *Ethiopian Horticulture Sector Statistical Bulletin*, no. 01. Ethiopian Horticulture Development Agency, October 2012, http://www.ehda.gov.et/; also www.my-mps.com

However, given the widespread dissatisfaction and concerns that have been raised throughout this research, we are far behind the position to argue that flowers exported from Ethiopia are environmentally sustainable. Concerns about use of pesticides with hazardous nature and poor waste (including pesticide container) management practices were raised in Chapter Five. The consequent impacts of these problems in water bodies and wetlands as well as on soil were addressed in Chapter Six and Chapter Seven, respectively. The case studies on Lake Ziway and Lake Tana indicated that the environmental impacts of pesticides and fertilizer residues from floricultural establishments on surface water are serious. Yet the majority of the companies established adjacent to the lakes are certified with MPS and Fairtrade.[98] While these environmental problems are tangible, personals in government institutions entrusted with the responsibility to enforce legislations (interviewed by the researcher) believe these voluntary and market based mechanisms (i.e. certifications) effectively regulate environmental impacts associated with flower production. The majority of them think that flowers are grown for export purposes and there exists strong international private standards that companies adhere to, without which they cannot sell at the international market. Nevertheless, first the majority of flowers grown in Ethiopia are sold at the auction where certification is not a requirement. Probably it is because of this reason that relatively a small number of companies certify their products with international standards. Second, private standards can play role in grower's effort to introduce some sustainable agriculture practices, but there are limitations in the standards to effectively influence production processes. Therefore, countries like Ethiopia should pull their resources towards strengthening implementation capacities of government driven regulatory mechanisms though they encourage private environmental standards.

[98] Sher Ethiopia (Afriflora) www.afriflora.nl, AQ Roses www.rosaplaza.nl, Tana Flora (www.tanaflora.com), Ziway Roses (www.hollaroses.com), Herburg roses (www.herburgroses.com) and Braam Roses are certified with MPS and/or Fairtrade. These information is retrieved from www.my-mps.com , accessed on 14 April 2016

8.2.4. Private Standards and Producers in Developing Countries

There is an on-going debate on the impacts of private standards on producers and developing countries' export supply. One the positive side, some benefits can accrue to producers in developing countries from adopting private standards. In a study that assessed firm's adoption of international standards in the Ethiopian floriculture industry, firms indicated that standards helped them to improve workers' skills, work efficiency and access to the international market.[99] Similar results were found by a study undertaken in the Kenyan Horticulture industry where producers indicate that implementation of EUREPGAP increased quality of production, reduced the amount of rejection by buyers and enhanced their bargaining power on product prices with the later.[100] Company officials in Ecuador said that Fairtrade certification is advantageous to differentiate their company and roses in increasingly competitive markets.[101] Coupled with the desire to build company reputation and improve financial performances, these benefits motivate flower growers to participate in one or more certification scheme.[102]

On the contrary, there are views that highlight on the adverse effects of ethical trading and associated international private standards on developing country producers. These mainly relate to limited technical, financial and institutional capabilities of producers to implement standards.[103] Standards related to product quality, environmental safety and labour protection may require change in production practices and new improved technologies.[104] In other words, the agricultural practices that private standards promote require firms to invest in technologies that improve production processes. As indicated in Section 2.3 of this

[99] Gebreeyesus , *supra* note 49, p. 11

[100] S. Asfaw, D. Mithöfer, and H. Waibel, What impact are EU supermarket standards having on developing countries' export of high–value horticultural products? Evidence from Kenya, *Journal of International Food & Agribusiness Marketing* (2010), Vol. 22, Issue 3, pp. 252– 276

[101] Raynolds, *supra* note 78.

[102] Though these can be motivating factors, most growers participate in the schemes to comply with buyer requirements, without which they cannot be able to supply. See BTC, *supra* note 21, p. 5

[103] C. Dolan and J. Humphrey, Governance and trade in fresh vegetables: the impact of UK supermarkets on the African horticulture industry, *Journal of Development Studies* (2000), Vol. 37, Issue 2, pp. 147–176; S. Henson and S. Jaffee, Food safety standards and trade enhancing competitiveness and avoiding exclusion of developing countries, *The European Journal of Development Research* (2006), Vol. 18, No. 4, 593–621; Hale and Opondo, *supra* note 24.

[104] Asfaw & et al, *supra* note 100; Raynolds, *supra* note 78, p. 507

research, these are accompanied by challenges for growers in developing countries due to lack of expertise, finance and other factors. The need to invest in new technologies can possibly affect the ability of firms, especially small producers, to join chains.[105] Doland and Humphrey argue that the requirements that large retailers in Europe state have "clear consequences for inclusion and exclusion of producers and exporters of differing type".[106] Also there are other costs associated with code of conducts. These include payments for labelling organizations and auditors which depend on where the auditing team is based and the amount of time the team spends in a field.[107] Evidences suggest that costs incurred for auditing and labelling are high and prevent small producers to engage in ethical trade.[108]

Compliance costs need to be compensated either through efficiency or increased price to customers.[109] Nevertheless, it is doubtful whether customers consent to pay additional cost where there are available "non-ethical" but cheaper goods in the market. According to a study conducted in the Netherlands, Germany, France and the UK, only 10% of consumers were found aware about the availability of sustainable flowers and plants in the shop.[110] There is basic limitation of information about where to buy and how to recognize sustainable flowers.[111] Literally speaking, most social and environmental standards in the flower industry are not communicated to consumers. Standards like MPS-ABC, GLOBALGAP and ETI are "used in the business-to-business environment", which means that consumers have little or no opportunity to know if flowers are certified with international

[105] In some cases buyers assist firms in developing countries to upgrade "if the costs of this assistance are more than offset by the benefits of integrating these firms into global value chains". J. Humphrey (2004), *Upgrading in Global Value Chains,* Working Paper No. 28, Policy Integration Department, World Commission on the Social Dimension of Globalization, International Labour Office, Geneva, p. 12 www.ilo.int , accessed on 23 March 2015. This happens when these firms provide such advantages as lower costs and access to scare resources- which cannot be accessed through FDI for economic reasons. This, however, may not happen in the case of floriculture where there is ample opportunity for buyers (lead firms) to source from growers in different countries. See Dolan and Humphrey, *supra* note 103, pp. 147-176; Asfaw & et al, *supra* note 100

[106] Dolan and Humphrey, *supra* note 103, p. 147

[107] Blowfield, *supra* note 29.

[108] *Ibid*.

[109] *Ibid*.

[110] BTC, *supra* note 21, p. 35

[111] *Ibid*.

standards. Under these circumstances, it can be difficult to assess consumer responses and financial returns to producers.

Standards that are communicated via consumer labels represent small portion of the market, but their share is increasing rapidly over the last years.[112] Studies undertaken in relation to products labelled with these standards (such as Fairtrade, Fair Flower Fair Plant) indicate that customers are willing to pay premium for green food products.[113] In relation to this, however, it is unclear whether eco-labelled food products are chosen for environmental or health-benefit reasons.[114] Apart from environmental consideration, several factors like food safety, health benefits, place of origin and animal welfare issues motivate the purchase of eco-friendly products.[115] Health and other concerns related to food products at the time of purchase might not apply to non-food products. Accordingly, earlier findings about consumer preferences for sustainable food products as well as willingness to pay premium price might not apply to other kinds of products. With the objective to exclude all the other driving factors, Michaud & *et al* focused their study exclusively on roses. Their conclusion suggests that consumers are concerned about production processes of roses and willing to pay greater price premium for Fair Flower Fair Plants labelled roses.[116] The result contravene with the argument that "certified flowers and plants generally do not receive higher prices than regular

[112] *Ibid*.

[113] D. Bougherara and P. Combris, Eco-labelled food products: what are consumers paying for? *European Review of Agricultural Economics* (2009), Vol. 36, No. 3, pp. 321–341; R. T. Tranter & *et al* , Consumers' willingness-to-pay for organic conversion-grade food: evidence from five EU countries, *Food Policy* (2009), Vol. 34, No. 3, pp. 287–294; J.R. Blend and E.O. Can Ravensway, Consumer Demand for Eco-labelled Apples,: Results from Economic Estimation, *American Journal of Agricultural Economics* (1999), Vol. 81, pp. 1072-1077; M. Loureiro, L. McCluskey and R. C. Mittelhammer, Will consumers pay a premium for eco-labelled apples? *Journal of Consumer Affairs* (2002), Vol. 36, Issue 2, pp. 203-219. This latter study, however, indicated that the premium for Food Alliance certified apples is small.

[114] C. Michaud, D. Llerena and I. Joly (2012), *Willingness to Pay For Environmental Attributes of Non Food Agricultural Products: A Real Choice Experiment*, Working Paper, National Institute for Agricultural Research. University of Pierre Mendes, France; D. Bougherara, and P. Combris, Eco-labelled food products: what are consumers paying for? *European Review of Agricultural Economics (*2009), Vol. 36, No. 3, pp. 321–341

[115]Michaud & et al, supra note 114, p. 314; C. Yue & et al, Investigating Consumer Preference for Organic, Local, or Sustainable Plants, *HORTSCIENCE* (2011), Vol. 46, Issue 4, pp. 610–615

[116] Michaud & et al, *supra* note 114, p. 314

products… certification merely functions as a key to access certain market segments".[117]

Unlike the above studies, a survey on firms in the Ethiopian floriculture industry indicated that the direct monetary rewards from adopting international standards are not as such significant.[118] Yet these firms incurred cost in order to comply with the requirements of the standards. Firms reported that they made organizational arrangements, improved information and technology facilities, constructed additional facilities, purchased new equipment, provided in-house trainings to their workers and improved their waste management practices.[119] The same is true for flowers sold at the auction as there are no significant price differences between certified and non-certified products.[120] In conclusion, there is no conclusive evidence about the willingness of customers to pay significantly high price for certified products. Though firms can build business reputation and have easy access to the European market for flowers by implementing private environmental standards, the costs they incur may not be compensated though adding prices to end products.

Despite all the challenges, the achievements of countries that pursue export-oriented development strategies depend on their ability to join global value chains. This approach, which highly depends on access to global markets, was successfully pursued by East Asian countries in 1970s, creating employment opportunity and decreasing poverty.[121] In this form of development strategy, countries take measures ranging from infrastructural support, such as modern transportation and communication networks, to subsidies for raw materials and credit facilities.[122] Parallel to these, they need to develop strategies that can enhance the competitiveness of their firms in developed countries' markets. Gereffi & et al note:

> for many industries access to international markets … involves gaining entry into international design, production and marketing

[117] BTC, *supra* note 21, p. 7
[118] Gebreeyesus, *supra* note 49, p. 11
[119] *Ibid*.
[120] BTC, *supra* note 21, p. 54
[121] Gereffi, *supra* note 1; Bair, *supra* note 2
[122] Gereffi, *supra* note 1

> networks consisting of many different firms. Understanding how these value chains operate is very important for developing country firms and policymakers because the way chains are structured have implications for newcomers. [123]

Developing countries and industries need to understand the ways of gaining access to skills and competences required to participate in global value chains, and make use of opportunities to upgrade their positions in the chains.[124] In relation to this, the measure taken by the Ethiopian government that gave legal basis for code of practice and certification is commendable. The Code of Practice can enhance sustainable flower production in the industry as required to join the direct strand floriculture value chain. The Regulation (No. 207/2011), in the preamble part, stresses on the need to define and regulate the essential elements of environmental sustainable and socially acceptable agricultural practices, and enhance the reputation of the Ethiopian floriculture industry. Nevertheless, these can only be realized where there is commitment on the part of the government and companies to implement the requirements of the Code.

Conclusion

This chapter highlighted the fact that private environmental standards and certification schemes are increasingly gaining importance to have access to the European market. Flowers destined to the European market have traditionally been sold at the Dutch auctions from where they are distributed to European retailers. But, recently there are changes in distribution channels as supermarkets began sourcing products directly from growers in developing countries. These market roots represent two distinctive strands of cut-flower value chains: the auction

[123] Gereffi, *et al*, Introduction: Globalisation, Value Chains and Development, *IDS Bulletin* (2001), Vol. 32, No. 3, p. 2

[124] *Ibid*. Entering export market for the first time is by itself challenging for many firms in these countries Producer firms need to have certain level of capability and knowledge related to bureaucratic procedures, national standards and requirements, marketing channels and consumer tastes These are some of the barriers that firms face to join chains. More specifically, floricultural industries face barriers of skills related to production at farm level, organization of postharvest logistic and marketing, and handling phytosanitary, customs and other international trade issues. See Wijinands, *supra* note 35; Humphrey, *supra* note 105.

strand and the direct strand. Private environmental standards and labelling initiatives are mostly associated with the later.

Due to the growing role of large retailers in directly sourcing flowers from producers in developing countries, the floriculture value chain characterized as buyer-driven. The chain is predominantly governed by large retailers, particularly European supermarkets, which demand product quality, consistency in volume, product variety and on time delivery. Pressurized by consumer interests and new patterns of consumption, they require processes of production to be sustainable. Large retailers are now engaged in practices of sourcing flowers produced without affecting the integrity of environment and local community. This has lead supplying companies to implement private standards and participate in labelling initiatives.

The chapter provided overview of private standards and certification schemes relevant for the flower industry. There are at least 16 different non-state mandated environmental and/or social standards and certification schemes for the industry. The standards generally foster sustainable production practices through promoting ecological improvements and reinforcing labour standards. The majority of them originated from Europe, however some have been initiated in producer countries by producers' associations in the forms of self-regulatory initiatives. A good example is the EHPEA Code of Practice, launched in 2007. Some companies in the Ethiopian floriculture industry are already with one or more certification of international private standards, such as MPS, Fairtrade and Fair Flowers Fair Plants. More than half of them are certified with EHPEA Code of Practice Bronze Level Certificate, while few of them accredited with the Silver and Gold Level Certificates.

Private standards can positively contribute for improvement of production and management techniques, and lead producers towards better social and environmental performances. Empirical evidences also confirm that companies reduced the use of chemical pesticide and water consumptions, and improved waste disposal systems following implementation of standards. The labour and environmental performances of certified companies exceeded the minimum legal requirements established by the law. Some efforts to introduce sustainable flower

production practices in the Ethiopian flower industry can also be positively associated with private standards. Nevertheless, contrasting conclusions can be found in other studies. Private standards are said to bring less impact on rights, such as freedom of association and the right to collective bargaining. There are also dissatisfaction in the implementation and auditing practices. Some standards have limitations in providing wider room for workers' and their representatives' participation in auditing processes. The existence of independent verification mechanism is sometimes questioned. Apart from this, in some instances, commercial requirements of buyers intervene in producers' effort to obey principles incorporated in private standards. For example, supermarkets' short notice orders force producers to engage in compulsory overtime.

Producers in developing countries, including Ethiopia, indicate that they increased quality of production and improved company reputation, workers skills, work efficiency and access to the international market by implementing international standards. However, there are costs associated with the standards that can hold back producers in developing countries from adhering to private standards. Standards related to product quality, environmental safety and labour protection may require change in production practices. Companies may need to invest in new improved technologies. These costs need to be compensated either through efficiency or increased price. Yet, there are doubts about the willingness of customers to pay premium prices for certified products. Producers in developing countries are, thus, on one hand, pressurized to take part in certification schemes which are compulsory to join the direct strand floriculture value chains, and on the other hand, stressed to compensate implementation costs.

Finally, the chapter found that though private standards and certifications play a role in minimizing environmental impacts and raising labour standards, it is not appropriate to completely relay on them to achieve environmental protection goals. Even if it is commendable to encourage implementation of private standards, Ethiopia should strengthen government driven standards.

Chapter nine: Conclusion

Introduction

This is the first detailed research, into the law and regulation of the Ethiopian flower industry. The role of the private sector is a critical part of the flower industry in Ethiopia and this places ever challenges on the regulatory system where there is limited experience of how best to regulate private sector entities especially when owned by foreign companies. In economies of developing countries, shortage of capital is a constraint to achieve economic development and alleviate extreme poverty. Promoting direct investment is a strategy that these countries follow in order to triumph over the shortage. Private Investment, foreign and domestic, is hoped to create benefits for developing host countries through employment opportunities, technology and skills transfer, national revenue generation and links to the international trading system.[1] Ethiopia is among the countries which recognise the role of the private sector in transforming the economy to a better level. As articulated in the investment law of Ethiopia, investment is encouraged and incentivised with the objective to "improve living standards" and "accelerate economic development".[2] Since 2011, there is sharp growth in inflows of investments and this is attributable to consecutive macro-economic policy measures taken by the government.

Floriculture is one of the sectors that have attracted both foreign (mainly) and domestic investments within short period of time in Ethiopia. The country ranked second exporter of cut-flowers to Europe from Africa within two decades since it changed the economy from command to free market. Conducive agro-climatic conditions, investment incentives, political stability and proximity to the European

[1] T. H. Moran (1998), *Foreign Direct Investment and Development: The New Policy Agenda for Developing Countries and Economies in Transition,* Institute for International Economics, Washington, D.C; K. P. Gallagher and L. Zarsky, "No Miracle Drug: Foreign Direct Investment and Sustainable Development", in L. Zarsky (2005)(ed.), *International Investment for Sustainable Development: Balancing Rights and Rewards,* Earthscan, London; OECD (2000), *Foreign Direct Investment, Development and Corporate Responsibility*, OECD Proceeding, OECD, Paris; I. A. Moosa (2002), *Foreign Direct Investment: Theory, Evidence and Practice*, Palgrave, New York, pp. 68-95; J. Jones and C. Wren (2006), *Foreign Direct Investment and the Regional Economy*, Ashgate Publishing, Hampshire, pp. 72-76

[2] Investment Proclamation No. 769/2012, the preamble and Article 5

market are among the main factors promoting flow of investment to the sector. The investment generated employment for thousands and the contribution of the sector for poverty reduction is usually highlighted. The majority of employees are women and this opportunity can contribute for their empowerment. This "most direct and biggest impact"[3] of the sector, however is countered with poor work conditions and exploitative nature of the employment. While workers are exposed to pesticides, which are hazardous to human health, wages are hardly enough to meet subsistence needs. Foreign exchange is the other benefit that the country seeks to gain through promoting investment to the sector. Yet quantifying the net income earned through foreign exchange is challenging since the great majority of inputs used for flower production are imported using foreign currency while foreign owned companies reserve the right to repatriation into their home countries of the proceeds of their operation.

Environmental problems, the main focus in this research, are the principal challenge that can diminish the sector's contribution for sustainable development. It is discussed throughout the thesis that the environment is exposed to degradation and pollution due to excessive use of pesticides and fertilizers. It will be recalled that the thesis mainly focused on assessing how effectively environmental impacts of flower production are regulated in Ethiopia, addresses the following specific but related questions:

- What are the main environmental challenges associated with commercial flower cultivation?
- How is commercial flower cultivation regulated in the Ethiopian legal system? What roles do national, international and non-binding instruments play in the regulation?
- What are the main problems in the regulation of environmental impacts of flower cultivation in Ethiopia?

[3] The Embassy of Japan in Ethiopia (2008), *A* Series *of Studies in Ethiopia, Study Report on the Floriculture Industry in Ethiopia*, Addis Ababa, p. 14. http://www.et.emb-japan.go.jp/Eco_Research_E.pdf, accessed on 13 August 2015

- What scientific/ technical methods are available to mitigate environmental impacts of flower cultivation?
- What motivates growers to adopt sustainable flower production practices? What are the main challenges that restrict industry wide implementation of the practices?
- What policy and legal measures are required to encourage companies implement good agricultural practices in floriculture sector?
- How do codes of practices and market labels contribute in minimizing environmental impacts of flower cultivation in Ethiopia?

9.1. The Industry's Growth and Contribution to the economy

The first chapter provides basic information about the Ethiopian floriculture industry. It begins with a historical focus on the industry, which has started with the establishment of the first private investments in 1990's. Consecutive polices measures taken to transform the command economy into free market since 1991, including deregulation of market and price, created suitable grounds for private investments and the emergence of the floriculture industry. Acknowledging the role of the private sector as a driver of industrialization process, the government created conducive environment for investment. Various incentive packages were made available for investors. These and favourable climatic conditions for flower production attracted investments into the floriculture sector.

Currently, in Ethiopia more than 80 companies cultivate mainly roses on 1500 ha of land. Most of these companies are foreign owned and the majority of flowers from Ethiopia are destined to the Dutch Auction Market. Achieving the status of the second largest exporter of cut-flowers from Africa, the country earned about 10% of the total foreign exchange from the sector in 2013/2014 budget year. However, there are doubts about the exact amount of foreign currency the country actually gains as a great majority of inputs are imported while foreign owned companies reserve the right to repatriation of the proceeds of their operations. Also the industry provides employment opportunity for more than 50,000 people. Though

the contribution of the sector has been praised for its contribution to poverty reduction, there are concern about employment safety and protection.

9.2. Flower Production Impacts on the Environment and Mitigating Measures

Commercial flower production, which is normally based on sophisticated greenhouse technology, needs huge amount of water and agro-chemicals, and generates enormous amount of wastes. Chapter Two demonstrates how this nature of production results in different forms of environmental problems, including pollution and overexploitation of surface and groundwater, soil degradation, and loss of aquatic life. Every stage in flower production, starting from soil preparation to post- harvesting, contributes to environmental degradation. The other aspect discussed in the chapter is the concept of sustainable flower production. As an industry, floriculture is providing employment for many people and, in the short term, it is contributing for poverty reduction in Ethiopia. The sustainability of the benefits and the industry, in general, however, requires reconsideration of the production processes so that the impacts on the environment are reduced. Guided by this notion, the chapter presented production techniques and innovative methods that help to reduce the application of agro-chemicals, water consumption, and waste generation, such as treatment wetland systems, composting, hydroponic, Integrated Pest Management and water recycling. Yet these methods and strategies can have implications for production costs and create economic pressures on growers in developing countries. Therefore, cost, together with lack of awareness and technological capability, can restrict growers from adopting environment friendly production methods. The chapter highlights that different factors, such as environmental laws and binding technical standards, influence the introduction of the methods.

9.3. Regulation to Minimize Environmental Impacts of Direct Investment

Taking the discussions made in Chapter two to the next level, Chapter Three focuses on the issue how countries hosting investment can minimize environmental

impacts of investment through regulation. Countries, like Ethiopia, with vulnerable economies and extreme poverty encourage inflow of foreign capital to overcome limitations in finance, foreign exchange, and skill. These are basic inputs for development. Investment can create employment opportunity, help countries to integrate into the international trading system; increase access to international markets; contribute for national revenue generation and infrastructure development. Accordingly, countries put different mechanisms to promote investment. Ethiopia is a good example where flows of investment exhibited a sharp growth especially since 2011 due to consecutive policy measures taken by the government. In 2014, estimated FDI flows to Ethiopia reached $1.2 million, increasing by 26 per cent. However, unequal negotiating power between least developed counties and investing companies; lack of institutional capacity to negotiate mutually beneficial investment arrangements; and weak political commitment diminish the contributory role of FDI for domestic development. With the view to remain competitive in attracting investment, countries may shy away from putting strong regulatory frameworks in place or may become reluctant to enforce them.

Premised on the conception that a well-regulated investment can positively contribute for sustainable development, the chapter argues that host states need to introduce different policy and legal measures aimed at minimizing negative effects on the environment and maximizing positive contributions to development. In view of this, the chapter borrowed some thoughts from ecological modernization theory to illustrate a system of multilevel environmental governance that involves the government, companies and civil society, and the respective responsibilities these stakeholders can assume in the protection of host state's environment. The chapter stresses that the main action towards regulation of environmental impacts of investment must come from the government. Governments need to introduce environmental regulatory mechanisms, which give wider room for non-governmental actors to participate in the process of controlling the environmental impacts of investment. Companies' self-regulation can complement a state's role in regulating investment. This calls for the involvement of the state and other actors.

The system of environmental governance in Ethiopia is introduced in Chapter Four. The Chapter briefly assesses existing policy and legal instruments, and the institutional framework for environment protection. The Constitution, environment policy document and environmental protection laws guarantee the right to improved living standards and to sustainable development in Ethiopia. As stated in the latest investment law of Ethiopia (Proclamation No. 769/2012, Article 5) the general objective of investment in Ethiopia is "to improve the living standard of the people of Ethiopia through the realization of sustainable economic and social development". However, as indicated in the chapter, compliance with environmental standards is not stated as a condition to grant, renew, suspend or revoke an investment permit. Apart from this, environmental sustainability is not mentioned among the grounds for investment incentives.

It is argued in Chapter Four that sustainable development require effective environmental governance in which different stakeholders, such as government organs, NGOs, professional associations, community representatives and business entities, take part in environmental protection. In line with this, the Environmental policy of Ethiopia stresses on the need to engage all stakeholders at all levels for effective environmental governance. The major gap identified in the chapter, however, is that environmental proclamations issued subsequent to the policy document have limitations in providing legal basis for stakeholders' participation in Environmental protection tasks. As a result, the responsibility to regulate and conserve the environment mainly rests on government institutions which are ineffective due to limited capabilities. Regulation simply drafted with the objective of forcing regulated entities to take specific actions or achieve desired outcomes will not usually bring the desired effect. The Code of Practice for Floriculture Regulation (No. 207/2011) is unique in terms of promoting company self-regulation. Accompanied by a certification system, it encourages implementation of good agricultural practices in the floriculture sector by going beyond the minimum legal requirement and invites companies to take part in the effort to achieve environmental sustainability.

9.3.1. Weak Pesticide Registration System, Absence of Post-Registration Control and Waste Management Issues

Chapters from Five to Seven are focused on analysing legislative frameworks for the regulation of pesticides and waste, water resources and aquatic life and the soil respectively. Chapter Five begins with the discussion of threats associated with the use of huge quantity of pesticides for flower cultivation in Ethiopia. Initially, growers were allowed to import pesticides of their choice since there was shortage of supply in the country. Some of the imported pesticides were found to be hazardous. Following concerns raised by the public, efforts were made to strengthen the pesticide registration and control system of the country through enacting laws and offering trainings. However, floricultural companies are importing pesticides without following the formal registration processes "under special arrangement to use only on their farms". This creates gaps in knowing the nature of pesticides used for flower production and regulation by the concerned government authorities. Even the formal registration system has its own limitations associated with lack of laboratory facilities and limited personnel with expertise. The main problem, however, relates with absence of full-fledged post-registration inspection of pesticides. As a result, once registered and imported, pesticides are left unregulated though there are possibilities of sale after date of use expired, removal of original label and alteration of packaging requirements. Also there is no Pesticide Stock Management System to monitor the distribution and use of imported pesticides. The chapter discussed the issue of obsolete pesticides to indicate the magnitude of the problem in mismanagement of pesticides and the challenge in disposing the products for countries like Ethiopia.

The other main issue discussed in the chapter is the issue of waste management in the Ethiopian floriculture industry and the existing regulatory frameworks. The Chapter reveals that there are serious problems in waste disposal practices among floricultural companies. For example, wastewater is directly discharged to water bodies and empty pesticide containers are burnt in an on-farm made incinerator barrel. The chapter suggests the introduction of a legislative framework that governs the management of wastes generated from the flower industry as the Solid

Waste Management Proclamation fails to address the regulation of agricultural wastes.

9.3.2. Regulation of Water Resources and Aquatic Life, Case Studies on Fresh Water Lakes

Issues of water resource and aquatic life management and regulation are discussed in Chapter Six. The main source being groundwater followed by surface water in Ethiopia, huge amount of water is used in year round flower production. The chapter indicates that flower cultivation can possibly impact ground water sources of the country. There are limited capabilities to study and monitor the resources and, as a result, large scale abstraction by flower companies can result in decrease of groundwater levels, flows and quality. The chapter incorporates case studies on two freshwater lakes (Lake Ziway and Lake Tana) with enormous environmental, economic and social significances, but which are being exposed to environmental challenges due to different factors. Flower farming adjacent to the lakes is presented as a threat leading to excessive water extraction and environmental pollution due to discharge of untreated effluents and run-off. Establishment of the investments on the shores of the lakes contribute to aquatic life degradation and wetlands destruction. Untreated effluents and run-off with agro-chemicals from floriculture establishments is a threat to biodiversity and aquatic life.

Pertinent policies and laws related to water resource and aquatic life are assessed. The Water Resource Management Policy and the Water Resource Management Strategy requires introduction of appropriate mechanisms to protect water resources, such as formulation of standards, controlling discharges and effluents into watercourses and assessment of groundwater in terms of their spatial and temporal occurrence. Different mechanisms to protect the resources against over-exploitation and pollution, such as water use permit, discharge permit and criminal liability, are provided in the law. However, major gaps and enforcement problems are identified. Well established and functioning permit systems that basically require anyone intending to extract water and/or discharge treated effluents to water bodies are non-existent. Though it is a legislative requirement, companies

extract and use surface and ground water sources without paying fees. The chapter also indicates that not all floricultural investment projects went through EIA which is procedurally important to evaluation impacts on water resources and other environmental resources and to take mitigating measures. These enforcement problems cast doubt over the effectiveness of regulation in Ethiopia which is attributable to lack of strong political determination, which, in turn, is embedded into the attitude that strict implementation of legal requirements obstruct the country's interest to enhance investment. It also is related with limited capability to enforce legislation. In relation to wetlands and aquatic life, neither wetland policies nor legislation that comprehensively address biodiversity conservation matters and aquatic lives exist. Only some basic principles on biodiversity conservation are found in the Environmental Policy of Ethiopia and the National Biodiversity Conservation and Research Policy.

9.3.3. Fragmented Regulation and Impacts on the Soil

Chapter Seven is devoted for the discussion of floriculture production impacts on the soil and its regulation. Chemical pesticides used to disinfest the soil and directly applied on the plant during the entire period of growth cause soil pollution. The chapter presented that pesticides and fertilizers used for this purpose in Ethiopia are impacting soil quality especially in areas where companies are concentrated (e.g. Holleta). Based on the facts and arguments presented in Chapter Six, it can be said that the impact can be severe in the long term as there is weak pesticide regulatory system in the country. Soil pollution problem is usually associated with soil-based production, which is the principal method of production in Ethiopian floriculture industry. The chapter illustrates how some chemicals, like methyl bromide, applied to the soil before flower plantation, can contaminate the soil and water sources. Though new alternatives are made available on the market, adopting them into practice are found to be challenging mostly because of extra expenses and lack of awareness. The chapter discusses the beneficial use of hydroponics in flower production to block the leaching of agro-chemical to the soil. It also presented biological pest control methods that can contribute in reducing the amount of pesticides sprayed on the plant. However, hydroponics is only used

by a few floricultural companies in Ethiopia and only some progressed well with biological pest control methods. Though the benefits these methods provide is acknowledged, they are not properly in use due to limited available knowledge, higher cost of skilled manpower and initial investment expenses. Most companies in Ethiopia lack the capability to respond to new and unforeseen challenges. The chapter indicates that even those companies with better capabilities refrain from introducing agricultural technologies. It argues that government-driven methods (either incentive or coercive) are important to encourage companies introduce technologies and engage in sustainable flowers production.

The chapter finally indicates that soil degradation is regulated under national legislation in fragmented way. Legislation concerning waste disposal, pollution and pesticide regulation can somehow extend protection for the soil. However, the protections they extend for the soil are not adequate. It is suggested that the foundations for sustainable use of soil need to be established in a well-designed legislative frameworks in order to prevent or minimize the risks of soil degradation. Some basic strategies include licenses to use soil, soil use agreements between the state and individuals, binding soil use standards and legal measures against failures to follow prescribed standards.

9.3.4. Relevance of International Agreements

Also from Chapter Five to Chapter Seven, pertinent international agreements governing pesticides, wastes, biodiversity, water resources, and soil are analysed with the objective of examining their contribution in minimizing environmental impacts of flower production. In relation to pesticides, two international conventions were addressed in Chapter Five. The first, the Stockholm Convention, bans or restricts the production, use and importation of hazardous substances among which are pesticides. The Rotterdam Convention, which bases itself on prior informed consent and exchange of information, enables counties to identify and have control over hazardous pesticides before entering to their territories. Biodiversity is the other area better regulated at the international level. Chapter Six indicates that the Convention on Biodiversity requires countries to identify and

monitor components of biodiversity important for conservation. It is also an obligation to identify processes of production that have impact on biodiversity and to take appropriate measure. Ethiopia, being a party to this and the above mentioned conventions, is expected to bring commitments into actions. Unlike in the cases of pesticides regulation and biodiversity conservation, however, there are no binding international agreements focusing exclusively on waste disposal, water resource management (except for transboundary watercourses) and soil protection issues. It seems that these are reserved for regulation by national legislation. In relation to wetlands, the Ramsar Convention is the main international agreement that require countries to develop national policies and legislation. However, the convention is not ratified by Ethiopia. In relation to soil, Chapter Seven discussed the World Soil Charter and the World Soils Policy that establish general guidelines for sustainable use of the resource, but these are non-binding international instruments.

9.4. Voluntary Environmental Standards and Certifications in the Floriculture Industry

In parallel with government driven regulatory frameworks, there are voluntary environmental standards and certification schemes which are part of companies' self-initiatives to achieve environmental protection goals. Chapter Eight examines these voluntary environmental standards directly related to the floriculture sector. Basic concepts about production chains and governance of value chains are discussed in the chapter. The cut-flower value chain, which is often buyer-driven, customers influence retailers' choice to source only from growers whose production process is sustainable, which in turn put strict requirements on growers. This has been leading growers to take part in certifications and implementation of international environmental standards.

As expounded in the chapter, there are a number of private standards and certification schemes applicable for the floriculture industry. The main ones include MPS-ABC, Fairtrade Principles for Flowers and FairFlower FairPlants. Incorporating basic principles related to pest, waste, pollution, soil and water management,

private standards and certification schemes promote sustainable flower production practices. Some empirical evidences confirm their contributory roles for environmental sustainability. Some companies in the Ethiopian floriculture industry obtain one or more certifications.

The majority of floriculture companies in Ethiopia are certified with Bronze Level Certificate of the EHPEA Code of Practice, evolved in the form of the floriculture industry's initiative to self-regulation. The chapter indicated that some initiatives taken by growers to introduce good agricultural practices in the industry can be associated with certification schemes. Nevertheless, the effectiveness of the standards and certification schemes is sometimes questioned as there are dissatisfactions with implementation and auditing practices. There are also doubts about the existence of independent verification mechanisms in the domestic context.

The role of private standards in building business reputation, improving production efficiency and opening international market opportunities is acknowledged by some producers, including in the Ethiopian floriculture industry. But, developing country producers encounter challenges to implement private standards because of limited technical, financial and institutional capabilities. While the standards require producers to invest in new technologies and change in production processes, it is doubtful that customers will be willing to pay premium prices for environmental friendly products.

9.5. Conclusion

Increasingly countries are encouraged by multi-nationals, Western countries and international donors such as the World Bank, IMF and others to take appropriate policy and regulatory measures in order to reap the benefits of investment.[4] Some of these are important measures focused on creating enabling-policy environment for investment through, for instance, building transparency and accountability,

[4] L. Zarsky (2005), *International Investment for Sustainable Development: Balancing Rights and Rewards.* Earthscan, London; OECD (2002), *Foreign Direct Investment for Development: Maximising Benefits, Minimising Costs,* OECD Publications, Paris

eliminating administrative barriers to entry and exit, and eradicating corruption.[5] Countries can have two equally competing interests: enhancing economic development and environmental protection. In dealing with these interests different approaches can be found. The first approach encourages countries to give priority to economic development over environmental protection; when the economy achieves a certain level of development so does its ability to solve environmental problems.[6] In other words, ecological preservation presupposes growth; it is only when a country achieves a certain level of economic development that it can protect the environment. Therefore, the primary focus of a state must be first on achieving economic development through utilisation of resources.

The second approach asserts on the need to reconcile and achieve the two interests simultaneously in line with what sustainable development demands. Prioritizing economic development over environmental protection can lead to environmental destruction beyond restoration. As a result, it is crucial to mitigate or control adverse impacts of development activities on the environment. "Environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it".[7] For this purpose, there should be appropriate regulatory policies and enforcement mechanisms established in host countries.

The right to improved living standards and to sustainable development is constitutionally guaranteed in Ethiopia (Article 43(1)). The Constitution and other subordinate legislation articulate the need to protect the environment against destruction during implementation of development programmes and projects. As a policy issue, the basic tenet of development is thus understood in the totality of

[5] World Bank (2003), *Global Economic Prospects and the Developing Countries 2003,* World Bank, Washington, DC, p. 79

[6] T. Panayotou (1993), *Empirical Tests and Policy Analysis of Environmental Degradation at Different Stages of Economic Development*, Working Paper WP238 ,Technology and Employment Program, International Labour Office, Geneva; G. Grossman and A. Krueger, Economic Growth and the Environment, *Quarterly Journal of Economics* (2005), Vol. 110, pp. 353-377; T. Panayotou (2003)., *Economic Growth and the Environment*, Harvard University and Cyprus International Institute of Management, Paper prepared for and presented at the Spring Seminar of the United Nations Economic Commission for Europe, Geneva, March 3, 2003, http://www.unece.org/fileadmin/DAM/ead/sem/sem2003/papers/panayotou.pdf, accessed on 13th September 2013

[7] The Rio Declaration, principle 4; Similarly, Agenda 21, under Phar. 8.4., states that national governments need to 'integrate environmental and development decision-making processes'.

protecting the environment, maintaining social interests and achieving economic growth. A logical extension of this is that a development approach which gives exclusive focus for economic growth and ignores to address the adverse impacts on the environmental is unacceptable. It also contravenes with the country's strategy to follow a green growth path and its commitments entered at the UN Framework Convention on Climate Change Conference held in Paris in 2015.[8] This line of policy needs to be harnessed through effective environmental regulatory frameworks, which depend on a country's capacity to implement regulations and a strong political commitment.

Fiorino outlines three responsibilities of national governments in relation to regulation of environmental impacts of investment.[9] These are determining what society's goals should be; deciding what specific steps should be taken to achieve them; and ensuring that large numbers of firms are complying with the requirements set in the regulation. This being an important consideration, the research analysed existing regulatory frameworks in order to assess how environmental impacts associated with flower production are regulated in Ethiopia. It identified legal lacunas that leave certain aspects of environmental impacts unregulated. For instance, there are no regulatory mechanisms to control non-point source of water pollution caused by run-off from floricultural establishments. Also there are major problems of regulation in relation to wetlands, agricultural wastes and soil pollution due to lack of legislation exclusively focusing on the issues. Yet stronger and comprehensive regulatory standards are necessary to bring about improved environmental performance. The second and the main problem in regulation of environmental impacts of investment is implementation of legislation, Fiorino's third responsibility of the government. Though the government is expected to ensure compliance with established environmental standards, basic requirements stated in the law that can contribute towards minimizing

[8] Ethiopia is committed, under the Climate-Resilient Green Economy Strategy of 2011, to build a green economy that helps to achieve middle-income status by 2025 through identifying green economy opportunities and keeping greenhouse gas emissions low. The country plans to limit soil-based emission and minimise pressure on forests from the expansion of land, reducing deforestation and introducing lower-emission agriculture techniques.

[9] D. J. Fiorino, *The New Environmental Regulation*, The MIT Press, Cambridge, 2006, pp. 190-191

environmental impacts of flower production are largely neglected. This is especially true in relation to pesticide registration, pesticide post-registration control, water use permit, discharge permit and environmental impact assessment. In relation to these, what legislative and enforcement strategies the country needs to adopt is an issue in need of future research.

There are two major reasons for lack of effective environmental regulation and governance in Ethiopia. The first and most noticeable problem is attributable to absence of political commitment to put in place and enforce legislative requirements. As noted above, floriculture is promoted with the objective to acquire such economic benefits as employment opportunities and foreign exchange earnings. These economic advantages are enormously required to reduce the extreme poverty and fill the gap in balance of payment. The investment thus occupies significant place in the country's strategy to achieve economic development. Consecutive measures have been taken to create favourable environment for investment. This notion seems wrongly understood among government authorities led them to become reluctant to enforce legislation on environment. A tendency of prioritizing economic development over environmental protection is witnessed in relation to environmental impact assessment where floricultural companies were allowed to establish without producing reports about possible impacts of their operation and mitigation measures. Some of these companies are now settled on the shores of freshwater lakes without putting in place wastewater treatment facility. Companies are allowed to freely utilize surface and ground water resources in the absence of full- scale investigation about impacts shrouded in the believe that denying water-use permits tantamount to obstructing the country's interest to attract investment. Also, floriculture companies import pesticides under lax arrangement without following the formal and legally established registration system. Beneath all these irregularities and self-restrictions lies anxiety that strict environmental regulation affects competitiveness in attracting investment in floriculture and the attitude that regularly procedures obstruct the "investment friendly environment". It is well established that, in order to remain competitive in attracting investment, states engage in the so called 'race

to bottom' refraining from effectively regulating environmental impacts of direct investment.[10]

The second contributory problem relates to capacity to enforce laws. The capacity of the state to formulate, implement and effectively enforce environmental regulations on any form of investment is important to achive sustainable development.[11] Nevertheless, developing countries lack these capabilities and expertise due to limited availability of resources.[12] This research found out that scarcity in laboratory facilities and other infrastructures, absence of trained personnel and limited availability of budgets are major impediments to monitor and control flower production activities that affect the environment. These scenarios attest that level of development creates obstacles over effective implementation of regulation. Complementary to this observation is the proposition by Panayotou in 1990's that favours, for the short term, economic development over environmental protection and asserts that a certain level of development is required to conserve environmental resources. This, however, may not always be valid when the irreversible nature of certain environmental problems and exhaustibility of resources is considered. Future research can focus on how developing countries, like Ethiopia, can overcome economic constraints they encounter to take environmental protections measures and how cooperation between the North and the South can be achieved for the sake of sustainable development.

In achieving ecologically sustainable economic development, strategies that intensify environmental technologies and bring changes in values and practices of companies play crucial roles.[13] The research provided overview of different

[10] K. R. Gray, Foreign Direct Investment and Environmental Impacts- Is the Debate Over?, *RECIEL* (2002),Vol. 11, No. 3, pp. 308-309; N. D. Woods, Interstate Competition and Environmental Regulation: A Test of the Race-to-the-Bottom Thesis, *Social Science Quarterly* (2006), Vol. 87, No. 1, pp. 175-176; C. Oman (2000), *Policy Competition for Foreign Direct Investment: A Study of Competition for Foreign Direct Investment*, OECD, Paris, pp. 91-94; R. Prizzia, The Impact of Development and Privatization on Environmental Protection: An International Perspective., *Environment, Development and Sustainability* (2002), Vol. 4, 2002

[11] L. Zarsky, "Havens, Halos and Spaghetti: Untangling the Evidence about Foreign Direct Investment and the Environment", in OECD (1999), *Foreign Direct Investment and the Environment,* OECD, Paris, p. 49

[12] Zarsky, *supra* note 4, p. 28

[13] D. Gibbs (2002), *Local Economic Development and the Environment,* Routledge, New York, pp. 7-8

production methods and technologies in sustainable flower production that can enable to minimize environmental externalities and resource inefficiencies. Though the benefits of these technologies are recognized, they may not be widely implemented in developing countries like Ethiopia because of economic pressures they create on commercial growers.[14] There are costs associated with innovative, complex and sustainable growing systems that need to be shared especially by end-consumers.[15] Also companies in Ethiopia state that the methods are expensive because of costs associate with initial investments, hiring skilled manpower and running of production systems. There are lack the capabilities to respond to new and unforeseen challenges. These are impeding factors for industry wide implementation of the technologies. Vox et al argue that environmental laws and binding technical standards aimed at "maintaining, improving, encouraging and sponsoring environmental protection, prevention and renewal" play significant role in the introduction of environmental friendly greenhouse systems.[16] But, as indicated above, different factors contribute towards the non- implementation or low level implementation of binding environmental standards in Ethiopia.

One way to bring changes in values and practices is to create a participatory form of environmental governance, which is more decentralized, flexible, and consensual rather than top-down hierarchical command and control regulation.[17] This gives opportunity for companies to engage in environmental protection initiatives through, for example, implementation of voluntary environmental protection standards. Implementation of such standards is becoming mandatory for floricultural companies that intend to join the direct strand floricultural value chain. The standards require companies to change unsustainable production processes into good agricultural practices. In the Ethiopian floricultural industry companies

[14] M. Raviv, *et al*, 2008. Growing Plants in Soilless Culture: Operational Conclusions in M. Raviv and J. H. Lieth (eds.), (2008), *Soilless Culture: Theory and Practice,* Elsevier, pp. 545-572.
[15] Giuliano Vox, *et al*, "Sustainable Greenhouse Systems" in *Sustainable Agriculture - Technology, Planning and Management*, Augusto Salazar and Ismael Rios (eds.), (2010) , Nova Science Publishers, p. 69
[16] *Ibid*.
[17] A. P. Mol, "Ecological modernization as a social theory of environmental reform" in M. Redclift and G. Woodgate (2010), *The International Handbook of Environmental Sociology, Second Edition* , p.68

that participate in certification schemes have been taking initiatives to implement some agricultural technologies such as hydroponics and biological pest control methods. Participation in the certification schemes requires installing agricultural technologies and change in production processes. Because of the cost involved with these methods and technologies, particularly small-scale companies may not take part and implement international environmental standards. This also affects their ability to join the floriculture value chain and directly supply to European retailer that offer better price than the auctions. This is another area that calls the attention of researchers.

Generally, in Ethiopia, where there is extreme level of poverty, investments into labour intensive sectors, such as Floriculture, continue to be encouraged. The Issue of environmental protection will remain a concern since regulation of flower production is complex within the social, economical and political contexts of the country. As floriculture is a young industry in Ethiopia, only the symptoms of environmental impacts are observed at the moment. The extent and the magnitude of the problem depend on future regulatory measures to be taken by the government and the ability of companies to adopt good agricultural practices. For the time being the industry is lagging far behind the road to sustainability. It is a lesson for the country that investment promotion strategies can result in a sudden gush of investment, but, in the long run, the economic benefits may not sustain while the environmental basis of the investment degrades.

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